

The Mineral Industry of Puerto Rico, the Panama Canal Zone, the Virgin Islands, and Pacific Island Possessions

The Puerto Rico section of this chapter has been prepared under a cooperative agreement between the Bureau of Mines, U.S. Department of the Interior, and the Mineralogy and Geology Section, Industrial Research, Economic Development Administration, Commonwealth of Puerto Rico for collecting information on all minerals.

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PUERTO RICO⁵

VALUE of mineral production in Puerto Rico increased to a record \$41 million, approximately 7 percent over that of 1962. Construction materials, represented by cement, sand and gravel, and stone, comprised about 54 percent, 25 percent, and 20 percent, respectively, of total value. Clays, lime, and salt accounted for the remaining 1 percent.

TABLE 1—Mineral production in Puerto Rico¹

Minera	1962		1963	
	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement..... thousand 376-pound barrels...	6,347	\$20,018	7,217	\$22,090
Clays..... thousand short tons...	219	131	200	168
Lime..... do.....	1	14	4	103
Salt..... do.....			8	131
Sand and gravel..... do.....	7,378	9,793	7,616	10,407
Stone..... do.....	5,589	8,551	5,334	8,237
Total.....		38,507		41,126

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

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A 9.6-percent increase in net income in 1963 indicated that the Puerto Rican economy continued to grow. The amount invested in public and private housing during 1963 increased about 19 percent over that invested in 1962. Most of the housing construction was in the greater San Juan area, chiefly because of the influx of population into the area. Highway construction continued at about the same level.

Exports from Puerto Rico in 1963 reached a record \$845 million. About 97 percent of Puerto Rican exports go to the United States. Value of imports into Puerto Rico totaled about \$1.2 billion, a 9-percent gain compared with the value in 1962. Mineral fuels, metals, and other raw and processed mineral products comprised about 23 percent of total value. Crude and unfinished oil imports from Venezuela and Netherlands Antilles increased 12 percent to an average 106,950 barrels per day. Imported oil was processed by the two Puerto Rican oil refineries.

Exploration for various minerals in the Island's mountainous interior continued. Active companies were Ponce Mining Co. (a subsidiary of American Metal Climax, Inc.), south of Utuado; Bear Creek Mining Co., southeast of Lares; and Newmont Exploration Co., Ltd., in the La Muda area south of San Juan. Ponce Mining Co. was driving an exploratory tunnel near Utuado to test a potential copper ore deposit.

The U.S. Atomic Energy Commission (AEC) and the Puerto Rico Water Resources Authority continued constructing the nuclear power-plant near Rincón, Aguadilla District. In late December, AEC announced approval to start operating the nuclear reactor. The plant produces superheated steam within the reactor core for generating about 16,300 kilowatts of electricity. Total cost of the plant was about \$18.3 million.

New aerial photographs of Puerto Rico and the offshore islands were taken during the first half of 1963. The Soil Conservation Service of the U.S. Department of Agriculture and the Geological Survey of the U.S. Department of the Interior conducted and financed the project. The Federal Geological Survey, working under a cooperative agreement with Puerto Rico Economic Development Administration, completed geologic mapping of three quadrangles; work continued on mapping more quadrangles.

During 1963, geologic maps of Vega Alta⁶ and Camuy⁷ were published. The Puerto Rican Department of Public Works, in cooperation with the Federal Bureau of Public Roads, was conducting a comprehensive and systematic survey of construction materials of Puerto Rico. Reports on Carolina⁸ and Vega Alta⁹ quadrangles were published. Similar reports on the Caguas, Bayamón, San Juan, Aguas Buenas, Gurabo, Naranjito, and Fajardo quadrangles were being prepared.

⁶Monroe, W. H. Geology of the Vega Alta Quadrangle, Puerto Rico, U. S. Geol. Survey Map GO-191, 1963.

⁷———. Geology of the Camuy Quadrangle, Puerto Rico, U.S. Geol. Survey Map GQ-197, 1963.

⁸Perry, A. O., and P. A. Gelabert. Construction-Material Resources of the Carolina Quadrangle, Puerto Rico. P.R. Dept. of Public Works Geol. Inv. Bull. 1, 1963.

⁹Perry, A. O. Construction-Material Resources of the Vega Alta Quadrangle, Puerto Rico. P.R. Dept. of Public Works Geol. Inv. Bull. 2, 1963.

REVIEW BY MINERAL COMMODITIES

NONMETALS

Cement.—The Puerto Rican cement industry was again the major contributor to the total value of mineral production in Puerto Rico. Shipments of portland cement totaled 7.2 million barrels, a 14-percent increase over that of 1962. A substantial increase in exported cement accounted for the record shipments. Decreased unit value prevented a corresponding rise in total value.

TABLE 2.—Portland cement production and shipments

Year	Production (barrels)	Shipments		Unit value
		376-pound barrels	Value (thousands)	
1954-58 (average).....	4,678,071	4,470,792	\$13,728	3.07
1959.....	5,324,188	5,302,312	16,982	3.15
1960.....	5,415,086	5,441,497	14,546	2.67
1961.....	6,070,140	5,931,420	16,946	2.86
1962.....	6,364,736	6,346,662	20,018	3.15
1963.....	7,171,302	7,217,417	22,090	3.06

The two Puerto Rican cement plants, Ponce Cement Corp. and Puerto Rico Cement Corp., merged and became Puerto Rican Cement Co., Inc.

Domestic demand for cement decreased. To compensate, exports of Puerto Rican cement increased 53 percent; imported cement decreased 11 percent and accounted for a lesser share of shipments of cement within Puerto Rico. Total stocks of cement at the two plants decreased to 180,000 barrels. The plants operated at an average 96 percent of capacity.

Puerto Rican Cement Co., Inc., announced plans to build a new plant to produce white cement. The plant will produce a premium-grade cement at an estimated rate of 350,000 bags annually.

Clays.—Most of the clay output was used in manufacturing cement. Minor quantities were used in studio potteries and in manufacturing heavy clay products. Total clay used by the two cement manufacturers and the clay products plant was about 9 percent less than that reported in 1962. A substantial quantity of sandy clay used for fill and various construction products was not included.

Diazlite, Inc., near San Juan, the first plant in Puerto Rico to produce expanded clay aggregate for the building industry, was completed in Trujillo Alto. Initial capacity of the plant was about 650 cubic yards per day. Company plans included exporting the light-weight aggregate to the Virgin Islands in addition to supplying Puerto Rican demands.

Lime.—The Puerto Rican Cement Co., Inc., lime plant at Ponce was completed in August and began producing at a rate of 20,000 tons of lime per year, less than half its full capacity of 45,000 tons. By yearend, the plant had produced about 3,600 tons of hydrated lime. Output of the plant was used for water purification and softening, sugar processing, and various purposes in the construction industries.

The South Puerto Rico Sugar Corp. was active during the year and produced about 600 tons of quicklime for use in processing sugar.

Salt.—Salt production in Puerto Rico during 1963 was severely affected by heavy rains that fell during the hurricane season. According to producers, about half of the prospective 1963 harvest was lost and major repairs were necessary on several salt ponds. Located in the extreme southwestern part of Puerto Rico, the salt ponds were operated by Puerto Rico Salt Works, Inc., Ponce Salt Industries, Inc., Carlos Ramírez Acosta, and Abel Carlo. Total production in 1963 was about 6,000 tons. The locally produced salt was used in tannery and in industrial operations related to fishing and fish canning. Ponce Salt Industries, Inc., imported about 12,000 tons of salt from Gran Inagua for refining to table salt.

Sand and Gravel.—Production of sand and gravel increased 3 percent in quantity and 6 percent in total value. Most of the sand and gravel produced in 1963 was higher value material used in public and private housing construction and highway building and maintenance. Use of white high-grade silica sand from inland beds west of San Juan was continued for cement manufacturing, glass, ceramics, foundries, and abrasives.

TABLE 3.—Sand and gravel sold or used by producers, by classes of operations and uses

(Thousand short tons and thousand dollars)

Class of operation and use	1962		1963	
	Quantity	Value	Quantity	Value
Commercial operations:				
Sand:				
Building.....	1,746	\$2,711	1,856	\$2,916
Paving.....	1,614	1,600	1,699	1,713
Fill.....	613	325	419	262
Other.....	102	108	29	54
Total sand.....	3,975	4,744	4,003	4,945
Gravel:				
Building.....	1,195	2,213	1,312	2,457
Paving.....	989	1,852	1,018	1,981
Fill.....	305	197	361	241
Other.....	167	155	138	119
Total gravel.....	2,656	4,417	2,829	4,798
Total sand and gravel.....	6,631	9,161	6,832	9,743
Government and contractor operations:				
Sand:				
Building.....	5	7	—	—
Paving.....	182	178	196	186
Fill.....	434	322	453	344
Total sand.....	621	507	649	530
Gravel:				
Building.....	6	8	—	—
Paving.....	20	34	18	30
Fill.....	100	83	117	104
Total gravel.....	126	125	135	134
Total sand and gravel.....	747	632	784	664
Grand total.....	7,378	9,793	7,616	10,407

Dredging operations continued in San Juan Harbor; at yearend, the job was about 71 percent completed. The purpose of the project was to deepen the channel 6 to 8 feet to new depths of 36 to 46 feet. About 12 million cubic yards of material will be removed to deepen the harbor.

Stone.—Limestone, classified as marble in many deposits, was produced in all seven districts. Andesite, tuffaceous siltstone, and miscellaneous volcanic stone were produced in all districts except Arecibo. Granite was produced in Humacao District and Guayama District. Basalt was produced in Mayaguez District. Stone output was 73 percent crushed limestone, 2 percent crushed granite, and 22 percent crushed miscellaneous stone. The remaining 3 percent was rough dimension stone and crushed marble. Most of the crushed limestone was used in cement manufacturing, concrete aggregate, road base, and fill. Crushed marble was used in making terrazzo. The two cement plants reported the largest crushed stone output, totaling about 1.9 million tons.

TABLE 4.—Stone sold or used by producers

Year	Dimension limestone		Crushed limestone ¹		Miscellaneous stone		Total	
	Short tons	Value (thousands)	Short tons	Value (thousands)	Short tons	Value (thousands)	Short tons	Value (thousands)
1954-58..... (average)	117,530	\$236	1,868,319	\$2,486	27,484	\$53	2,013,333	\$2,775
1959.....	10,322	23	1,980,840	2,693	72,000	162	2,063,162	2,878
1960.....	36,941	87	3,474,462	5,938	708,080	1,636	4,219,433	7,661
1961.....	² 77,133	213	3,718,011	4,546	1,253,524	2,525	5,048,668	7,284
1962.....	60,787	130	4,269,840	5,829	1,258,080	2,592	5,588,707	8,551
1963.....	64,647	152	3,918,331	5,306	1,350,510	2,779	5,333,538	8,237

¹ Includes limestone for cement and lime.

² Includes dimension marble.

MINERAL FUELS

Record quantities of crude petroleum imported from Venezuela were refined by the Cataño plant of Caribbean Refining Co., San Juan District, and Commonwealth Oil Refining Co., Mayaguez District. Output of these refineries was used in the growing chemical complex developing in Puerto Rico.

TABLE 5.—Value of mineral production in Puerto Rico, by districts

Senatorial district	1962	1963	Mineral products produced in order of value
Aguadilla.....	\$1,322,185	\$1,371,600	Stone, sand and gravel.
Arecibo.....	1,211,715	1,130,155	Do.
Guayama.....	1,525,780	1,184,525	Sand and gravel, stone, clays.
Humacao.....	731,798	777,259	Stone, sand and gravel.
Mayaguez.....	2,194,189	2,497,058	Sand and gravel, stone, salt, lime.
Ponce.....	12,472,442	13,466,927	Cement, sand and gravel, stone, lime, clays.
San Juan.....	19,049,201	20,698,476	Cement, sand and gravel, stone, clays.
Total.....	38,507,310	41,126,000	

Commonwealth Oil Refining Co. began expanding its refinery near Ponce. The first step, costing about \$5.1 million, would increase daily processing capacity to about 115,000 barrels, up from the present 90,000 barrels. Completion of the project was scheduled for early 1964. The company also announced plans to build a \$23 million petrochemical plant in Puerto Rico. The plant would produce inorganic compounds from petroleum feedstocks, principally benzene, toluene, and xylene. It will be built near the company's oil refinery at Guayanilla Bay near Ponce. Completion was scheduled for early 1965.

METALS

Industrial Siderurgica, Inc., produced reinforcing bars from domestic and imported iron and steel scrap. Expansion of this plant progressed during the year. Added facilities would include a 500-ton scrap shear and two 20-ton electric arc melting furnaces. A two-strand continuous casting machine would be installed in conjunction with the furnaces. This casting machine would be capable of converting molten steel directly into a continuous 4-inch or 6-inch billet for drilling, reinforcing, and merchant bar products.

Danrich Steel Co., Inc., was planning to construct a steel reinforcing rod plant.

PANAMA CANAL ZONE ¹⁰

The mineral industry of Panama Canal Zone was less active in 1963 than in 1962. This was indicated by the 16-percent decrease in overall value of mineral production. Sand and gravel was produced by Panama Sand Co., Inc. Basalt and miscellaneous stone production decreased 22 percent in quantity and caused the drop in total value.

VIRGIN ISLANDS ¹¹

Reported production of basalt in the Virgin Islands was much greater than the 1962 level. A. C. Samford Corp. was the major stone producer. The stone was used principally for concrete aggregate, roadstone, and riprap.

TABLE 6.—Mineral production in the Panama Canal Zone and Virgin Islands ¹

Mineral	1962		1963	
	Short tons	Value	Short tons	Value
Canal Zone:				
Sand and gravel.....	70,268	\$76,914	83,633	\$87,057
Stone ²	207,373	359,173	161,501	281,021
Total.....		436,087		368,078
Virgin Islands:				
Stone (basalt).....	21,273	82,348	65,973	328,919

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

² Includes basalt.

¹⁰ Prepared by Harry F. Robertson.

¹¹ Prepared by Harry F. Robertson.

TABLE 7.—Sand and gravel sold or used by producers in the Panama Canal Zone

Year	Short tons	Value
1954-58 (average).....	23, 402	\$26, 104
1959.....	14, 392	20, 500
1960.....	65, 000	68, 149
1961.....	75, 204	73, 274
1962.....	70, 268	76, 914
1963.....	83, 633	87, 057

TABLE 8.—Crushed basalt and miscellaneous stone sold or used by producers in the Panama Canal Zone

Year	Short tons	Value
1954-58 (average).....	146, 810	\$209, 989
1959.....	223, 348	270, 085
1960.....	203, 355	305, 914
1961.....	162, 704	270, 780
1962.....	207, 373	359, 173
1963.....	161, 501	281, 021

TABLE 9.—Crushed basalt sold or used by producers in the Virgin Islands

Year	Short tons	Value
1954-58 (average).....	10, 640	\$33, 121
1959.....	14, 439	50, 616
1960.....	14, 895	51, 287
1961.....	20, 302	75, 899
1962.....	21, 273	82, 348
1963.....	65, 973	328, 919

Harvey Aluminum, Inc., announced plans to utilize a water-desalting facility to convert sea water into vast quantities of fresh water needed to process alumina. Design capacity of the facility was 750,000 gallons of water per day. The process features an advanced-design flash evaporator, using tubing and plate made of titanium. The plant would be at St. Croix and would provide fresh water and electricity to supplement that produced by the sea water conversion and electric turbogenerating plant at Krum Bay. The existing plant averages about 300,000 gallons of fresh water per day.

Dredging of Charlotte Amalie Harbor was completed in mid-1963. A total of 800,000 cubic yards of sand and coral was removed from the bottom of the harbor and used as fill to reclaim 37.5 acres of land for industrial and commercial purposes. The dredging eliminated a shoal in the harbor that had seriously restricted the moving of large vessels. Minimum depth of the harbor was increased from 16 to 33 feet.

REVIEW BY ISLANDS ¹²

American Samoa.—Substantial quantities of coral sand and basalt rock were quarried during 1963 for use in expanding public utilities, improving roads, and constructing new schools, housing units, and communications facilities. Public works crews utilized a dragline

¹² Prepared by Roy Y. Ashizawa.

to recover coral sand and operated a portable crusher at a basalt quarry.

Canton.—Federal Aviation Agency employees produced coral limestone for road maintenance and for stabilizing portions of the runway approaches.

TABLE 10.—Mineral production in the Pacific Island possessions

Area and mineral	1962		1963	
	Short tons	Value	Short tons	Value
American Samoa:				
Pumice (volcanic cinder).....	50,490	\$108,192		
Sand.....	2,717	3,705	76,680	\$192,720
Stone (crushed).....	1,103,113	1,787,830	944,372	2,351,112
Total.....		1,899,727		2,543,832
Canton: Stone (crushed).....	130	500	1,560	6,000
Guam: Stone (crushed).....	81,745	122,938	306,995	438,146
Wake: Stone (crushed).....	4,880	40,750	8,585	50,500

Guam.—While rebuilding from a typhoon that occurred in November 1962, Guam was again struck by typhoon-scale winds and heavy rains in April 1963. Virtually all of the repair work and the temporary housing units built in the wake of the 1962 storm were severely damaged. Rehabilitation required large quantities of coral limestone. Commercial producers quarried and processed this material near Barrigada and Tumon. Coral pits in other areas were worked by government crews and contractors to obtain rubble for foundations and concrete aggregate for use in rebuilding roads, buildings, utilities, and sanitary facilities.

Wake.—Coral limestone was used by Wake Island crews and contractors in constructing a concrete jet-blast fence, hardstands, and building foundations, and for road maintenance.

Other Pacific Island Possessions.—No mineral production was reported on the Islands of Enderbury, Jarvis, Johnston, Midway, and Palmyra.