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MINERAL RESOURCES

The most significant mineral commodity is limestone, found at or near land surface throughout the entire area, and used as base material for roads and airport runways, as construction aggregate, and in the manufacture of cement.

Small quantities of oyster shell were, in the past, dredged for use in road construction. However, restrictions against dredging have eliminated oyster shell as a mineral commodity. No oyster shell was dredged in 1971.

Economic Aspects



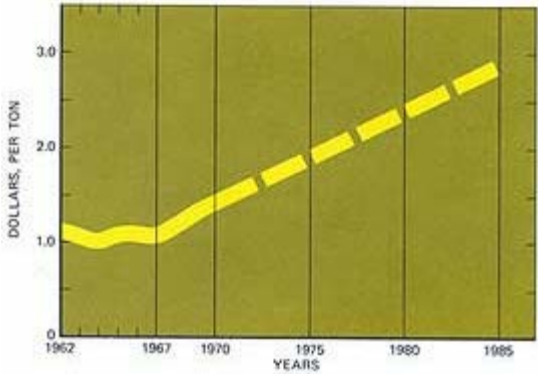
The principal product of the construction minerals industry is crushed limestone which varies in size depending upon end-use specifications. These specifications are largely governed by needs of the largest single purchaser, the Florida Department of Transportation. The two principal criteria are abrasion resistance and carbonate cement. Generally, stone to be used for aggregate must possess an abrasion resistance in which the material loss as determined by the Los Angeles Abrasion Test does not exceed 40 percent. Specifications require that the carbonate content of limestone must not be less than 70 percent, but may be as high as 95 percent, depending upon intended use. Most of the limestone meets both specifications.

Three percent of the total limestone output in 1971, crushed to one-fourth inch or less, is marketed locally as sand and gravel.

Approximately 25 percent of the limestone quarried is used to make Portland cement, but local production does not meet demand and much is imported.

The total limestone resource is about 85 billion tons, of which 32 billion tons is available for quarrying under present conditions. The remainder is unavailable because of urban development.

Quarry operators seldom stockpile limestone and there are virtually no imports of crushed production of limestone in Dade and adjacent Broward County increased from 10.9 million tons in 1962 to 21.3 million tons in 1971. By 1985, production of approximately 33.0 million tons is projected for the two counties. In 1962 and 1971,



The upward trend of the price of crushed limestone is expected to continue. [\[larger image\]](#)

prices per ton, f.o.b. quarry, averaged \$1.06 and \$1.42, respectively; by 1985, a price of \$3 per ton is expected.

### Quarrying Methods

The average depth currently being quarried is 40 feet. Overburden is removed by bulldozer and placed around the perimeter of quarry sites. Holes are bored in the limestone and blasting agents are emplaced and detonated.



Quarrying limestone is the largest mineral industry in the area. [\[larger image\]](#)



Quarried limestone is crushed to specifications for construction and other uses. [\[larger image\]](#)



Abandoned quarries frequently become lake-centered real estate developments. [\[larger image\]](#)

The fragmented limestone is extracted by dragline. Because of the shallow water table, drilling, blasting, and extracting are largely done under turbid water, which reduces quarrying efficiency.

After extraction, the limestone is placed on a surge pile for partial drying. It is then removed by conveyors or trucks to primary and secondary crushers for reduction and sizing to end-use specifications.

A factor that will take on increased significance in the future cost of crushed limestone is length of haul. While direct costs in 1971 run about \$1.25-\$1.65 per ton, truck haulage adds \$0.15-\$0.25 per ton for the first mile and \$0.05-\$0.10 per ton for each additional mile.

### Environmental Implications

Most residents do not welcome a limestone quarry as a neighbor. The principal objections to most quarries are dust, noise, and traffic. Fortunately for their neighbors, the quarries of south Dade County are filled with water which reduces both dust and noise. Further, dust-control measures such as water spraying of crushers and roads are also used.

Although dust and noise problems are minimized, conflicts still arise between quarries and their urban neighbors. Such conflicts generally result in statutory regulations which limit working hours and quarrying procedures.

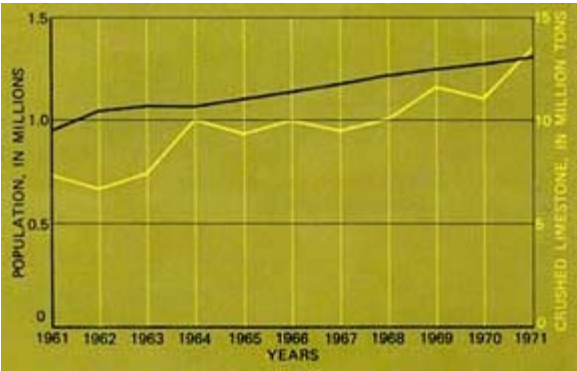
As the urban area expands, active quarries and potential quarry sites are encroached upon. The conflict between quarrying and urban use of land tends to force quarry operations to remote areas, which significantly increases transportation cost, that in turn becomes a large part of the total cost of the product. Consequently, the effect of continued urban expansion and corresponding economic growth on limestone quarrying should be considered in urban planning.

No major or lasting water pollution problems result from quarrying operations in south Dade County. Water turbidity is temporary, and the water soon clears when operations cease.

The long-range effect of quarrying on land values in south Dade County is variable, but generally it is beneficial as abandoned quarries commonly become recreational lakes. Dade County requires a rectangular pattern of quarrying which results in choice lake-front land. For example, peripheral land worth \$15,000 per acre before quarrying may be worth \$25,000 per acre after quarrying.

The demand for crushed limestone is increasing. Future restrictions on quarrying would

limit the supply of lowcost limestone. Reduction in limestone production or increase in limestone price could retard growth.



The demand for crushed limestone in Dade County has paralleled the population growth. [\[larger image\]](#)

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