MARQUETTE AND HENDERSON QUARRIES

SHARP COUNTY, ARKANSAS

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Introduction

At the request of Mr. Ray C. Smith, owner, an examination was made of the Marquette and Henderson quarries near Williford, Arkansas, on April 12 and 13, 1951. This report includes the findings of the examination and results of chemical analyses made by Troy W. Carney, Chief Chemist, Division of Geology, Arkansas Resources and Development Commission.

Location and Accessibility

The Marquette quarry is located in SE$\frac{1}{4}$ of section 35, and SW$\frac{1}{4}$ of section 36, T. 19N, R. 4W, Sharp County, Arkansas. It is about half a mile southwest of the town of Williford. The Henderson quarry lies about one mile northeast of Williford in the E$\frac{1}{2}$ NW$\frac{1}{4}$, sec. 31, T. 19N, R. 3W. Williford is located on the Memphis-Kansas City line of the St. Louis and San Francisco railroad. Both the Marquette and Henderson quarries are situated adjacent to this railroad. The area is traversed by U. S. Highway No. 63 which follows a general east-west direction and by Arkansas State Road No. 58 leading southward from Williford to Cave City and Batesville.

Marquette Quarry

The Marquette quarry has been developed in the Jefferson City dolomite of lower Ordovician age. Typically, the Jefferson City consists of beds of gray crystalline dolomite, usually carrying considerable quantities of chert nodules interbedded with thin-bedded, fine-grained dolomite of lighter color which is largely free of chert. Occasional thin shale beds and sandy layers are interbedded with dolomites. Fossils are relatively rare throughout the formation.

The quarry opening is roughly semi-circular in outline. The open or south side facing the St. Louis and San Francisco railroad and Spring River is approximately 500 feet across. The strata exposed in the quarry and the quarry floor are nearly horizontal, but low dips to the southwest were observed near the west end of the face. These dips are not steep enough to present any problem in quarrying and probably will be advantageous in developing drainage for the quarry floor.

At its eastern end the quarry face is 60 feet high and gradually increases in height toward the western end where it is about 70 feet high. Throughout most of its length the lower part of the quarry face is concealed by broken stone which has fallen or been shot from the face. In the part which could be examined a 3-inch bed of greenish shale was observed 5 feet below the top of the face. A slightly thicker bed of shale lies about 7 feet below the first, and a belt in which chert nodules were especially numerous extends from 15 feet to about 25 feet below the top of the face.

An area of approximately 4.3 acres immediately behind the quarry face has been stripped of overburden and is now clean except for a thin layer of rubble and wash which has accumulated since operation of the quarry ceased. At the time the examination was made preparations were under way to remove most of this material for use as road metal.

An additional area of about 5.7 acres from which the overburden has not been removed is believed to be quarryable to the level of the present quarry floor. Overburden of soil and waste rock to be removed from this area is estimated at 16,000 cubic yards.

Broken stone shot from the quarry face forms a pile averaging 75 feet wide and 40 feet high against the middle part of the quarry face. The volume of stone in this pile is included in the following estimate of stone recoverable from the quarry.

Estimate of reserves

Broken stone on quarry floor	22,000 tons
Stone in place, overburden removed	1,010,000 tons
Stone in place, overburden to be removed	1,400,000 tons
Total	2,432,000 tons

Two samples of stone from the Marquette were analyzed and the results are shown on the report of analysis attached. Sample "A" was a random sample representative of the material blasted from the quarry face and now lying on the quarry floor. Sample "B" represents a random sampling of eight piles of crushed stone of various screen sizes remaining from earlier operations of the quarry. It is believed that both Samples A and B fairly represent the stone exposed in the quarry face. The silica content of the stone, amounting to more than 16 percent, is too high to permit its use as furnace fluxing stone. The calcium carbonate equivalent of both samples exceeds the 85 percent minimum specified for aglime by A.A.A. The relatively high silica content will probably produce excessive wear in crushing equipment.

Henderson Quarry

The Henderson quarry has been developed in the Cotter dolomite which is lower Ordovician in age. The strata exposed consist of massive beds of medium-grained gray dolomite and fine-grained white to buff dolomite. A few thin sandy layers are interbedded with the dolomites but cherty layers are not conspicuous.

The floor of the quarry dips irregularly to the south and southwest at angles varying between 5 degrees and 9 degrees. This dip will be an advantage in maintaining adequate drainage and will not present serious quarrying problems. In the area to the west of the present quarry it is estimated that a maximum thickness of 20 feet above the level of the railroad can be economically quarried. This area will yield approximately 380,000 tons of stone. The area lying east of the present quarry face and extending to Martin's Creek has thicknesses of quarryable stone varying from 50 feet to 80 feet above the level of the railroad. Overburden will probably average 20 feet in thickness. This area should yield approximately 1,960,000 tons of stone, making the estimated amount of stone available from the Henderson Quarry amount to about 2,440,000 tons.

Analyses of two samples from this quarry indicate that the calcium carbonate equivalent of the dolomite will exceed the minimum required for use as agricultural limestone. As shown on the report of analysis attached, Sample "C" falls slightly below the 85 percent calcium carbonate equivalent required. This is not regarded as being of adverse significance since Sample "C" represented a north-south section across the quarry floor at a horizon which is quite apparently more siliceous than most of the overlying beds. Sample "D" which represents the beds exposed in the quarry face yielded a calcium carbonate equivalent well above the minimum required.

The stone will be found satisfactory for use as ballast, road metal, and concrete aggregate. It should prove to be a superior material as aggregate for bituminous paving.

The relatively high silica content of stone from the Henderson quarry would prevent its use as a furnace fluxing stone and would probably eliminate it from consideration as a raw material for refractories.

REPORT OF CHEMICAL ANALYSIS

Arkansas Resources and Development Commission
Division of Geology

Room 446 State Capitol Building — Little Rock, Arkansas

From: Division of Geology
E. B. Brewster

Sample No. 1157

Date 4/16/51

Location: Sharp County

Kind of Material: Dolomite (Marquette Quarry - Jefferson City)
(Henderson Quarry - Cotter Dolomite)

Test recommended for: Ca, $MgCO_3$, SiO_2, R_2O_3, Fe_2O_3

ANALYSIS

	Marquette Quarry		Henderson Quarry	
	A Random sample	B Random sample from stockpile	C N-S section across floor	D Random sample blocks fallen from east face
SiO_2	16.04	16.80	18.87	11.77
$CaCO_3$	45.7	46.4	45.3	48.3
$MgCO_3$	33.6	33.2	31.4	35.6
Al_2O_3	2.01	1.79	2.16	1.05
Fe_2O_3	0.57	0.36	0.39	0.40
Equivalent $CaCO_3$	85.7	85.8	82.5	90.6

Date Completed: 4/26/51

By (Troy W. Carney)
Chief Chemist