

**KANSAS GEOLOGICAL SURVEY  
OPEN-FILE REPORT 48-6**

**PROSPECTS FOR MAKING ROCK WOOL AT THOMPSON CRUSHED  
ROCK COMPANY NEAR KANSAS CITY, KANSAS**

by

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KGS  
OF  
48-6

February 3, 1948

The Thompson Crushed Rock Company  
R. R. 2  
Kansas City, Kansas

Attention: Mr. Leonard Strauss

Gentlemen:

In accordance with your request we have analyzed the samples obtained by means of core drilling the materials above and below the Bethany Falls limestone that is being worked in your mine.

The samples taken below the floor of the mine include the entire thickness of the Hushpuckney shale, which at the point of sampling is 2.0 feet. The 2-foot core was divided into four equal lengths of 0.5 feet each, and were labelled, beginning from the floor down, A, B, C, and D.

The samples taken from above the Bethany Falls limestone include the Calesburg shale and the lower 3 feet of the Dennis limestone — a total thickness of 7.2 feet. The Calesburg shale was divided into two nearly equal portions. The lower 2.0 feet is labelled E, and the upper 2.2 feet F. The samples from the lower part of the Dennis, in ascending order, are as follows: sample G, black bituminous shale, 1.0 feet; sample H, dark-gray clay shale, 1.0 foot; sample I, clayey limestone, 1.0 foot.

The accompanying stratigraphic section gives the position and thickness of samples included in the tests. The results of the tests are tabulated on the enclosed sheet.

Samples taken in 1936 from the same beds, but at a different point in the mine, had somewhat different compositions. These differences may have been due to inaccurate sampling in 1936, or to lateral variations in the composition of the rocks. If variations exist they will not cause serious difficulty because the percentage of Bethany Falls limestone which will have to be added to the other materials to bring the total to the correct composition will vary within rather narrow limits.

The correct composition for the production of rock wool can be obtained with a variety of mixtures. Fusion tests were run on three such mixtures. Mixture no. 1 included samples A, B, E, F, G, H, and I in proportion to the thickness of each, plus 30 percent Bethany Falls limestone fines. The percentage of each sample used in the mixture is given below:

Sample A	6.1 percent)	First 1.0 foot below floor of mine
Sample B	6.1 )	
Sample E	24.4 percent)	First 7.2 feet above Bethany Falls limestone
Sample F	26.8 )	
Sample G	12.2 )	
Sample H	12.2 )	
Sample I	12.2 )	
Bethany Falls limestone	<u>30.0</u> percent)	Fines from screening
	100.0 percent	

The calculated loss on ignition of this mixture is 22.5 percent. The mixture was melted in a quart-sized fire-clay crucible. At 2,400° F. the batch softened and slumped. At 2,650° F. it was completely fluid, and could be poured in thin stream after removing the crucible from the furnace.

It also could be pulled into a fine thread at this temperature and lower.

For a mixture having a loss on ignition of only 22.5 percent the pouring temperature of 2,650° F. is surprisingly low. We believe that the presence in the materials of appreciable percentages of calcium phosphate and alkalies account for the low pouring temperature.

Mixture no. 2 was made up of 50 percent Bethany Falls limestone fines plus 50 percent Hushpuckney shale. The entire 2-foot thickness of this shale was included. The calculated loss on ignition of mixture no. 2 is 26 percent. At a temperature of 2,560° F. this mixture was fluid enough to pour in a thin stream, and to pull into a fine thread.

Mixture no. 3 was composed of samples A to H, inclusive, in proportion to the thickness of the beds, plus Bethany Falls limestone fines. The percentage of each sample used in the mixture is given below.

Sample A	3.05 percent)	2.0 feet of Hushpuckney shale under floor of mine.
Sample B	3.05 )	
Sample C	3.05 )	
Sample D	3.05 )	
Sample E	12.20 percent)	4.2 feet of Galesburg shale above Bethany Falls limestone.
Sample F	13.40 )	
Sample G	6.10 percent)	Lower 2.0 feet of Dennis limestone above Galesburg shale.
Sample H	6.10 )	
Bethany Falls limestone	<u>50.00</u> percent)	Fines from screening.
	100.00 percent	

The calculated loss on ignition of mixture no. 3 is 26.7 percent. The temperature at which it melted to a thin fluid, poured readily in a thin stream, and would spin a thread was 2,530° F.

Mixture no. 3, as shown above, includes all the easily available materials above and below the Bethany Falls limestone. In bringing down the beds above the mine workings the 2-foot roof, composed of Bethany Falls limestone, would of course be brought down also. Whether or not this was used for crushed limestone or as an ingredient in the rock wool mixture would depend entirely on the judgment of the operators of the mine.

Actual blowing tests were run with mixtures of materials from your mine in 1936. One mixture (C in the 1936 report) was nearly identical to mixture no. 3 given above. It produced a fine white rock wool having an average fiber diameter of 5 microns. We were also able to produce a slightly coarse white wool from the Galesburg shale alone. This corresponds to samples E and F in this report. The loss on ignition as determined on the 1936 sampling was 21.3 percent as compared to about 10 percent for the 1948 sampling. We believe that some of the upper nodular portion of the Bethany Falls limestone must have been included with the Galesburg shale when the sample was taken in 1936. The report on the materials sampled in 1936 was published in 1937 under the title "Rock Wool Resources of Kansas." This report is out of print, but we are copying the information about your material from pages 13-16 of this report.

"Location of Outcrop Sampled. A quarry one-half mile west of Morris, Johnson County, and 3 miles west of Kansas City, Kansas, in the escarpment south of the Kansas river. The quarry is operated by the American Sand Company, Turner, Kansas.

"Stratigraphy. The rocks sampled at Morris include the Bethany Falls limestone member of the Swope formation, the Galesburg shale, and the Stark shale member of the Dennis formation. All of these rocks belong to the Bronson group of the Missouri series.

"The Bethany Falls limestone is being mined for road and building materials by the room and pillar method, entering on a level a little above the flood plain on the south side of Kansas river. The Galesburg shale forms the roof of the mine; sample no. 1 is a shale-limestone mixture from the floor of the mine.

"It was impossible at this place satisfactorily to sample 50 to 60 feet of limestone and shale that are exposed in a vertical cliff above the Stark shale in the quarry. Most of this stratigraphic section, however, was sampled from other locations and produced satisfactory wools in the blowing tests.

"Results of Tests. All the rocks represented by the samples selected for testing can be taken from the mine. Use of the rock represented by samples no. 3, 4, and 5 would entail an increase in the height of the mine 7 feet, to the base of the Winterset limestone. Similarly, use of the rock represented by sample no. 1, would require the lowering of the floor 1 foot.

"Wool rock A is a mixture of the Galesburg shale and the Bethany Falls shaly limestone (no. 1) of the mine floor. These samples were mixed in the proportion of the outcrop thickness of the two rocks; that is, five parts Galesburg shale to one part Bethany Falls shaly limestone. A fairly fine white wool was produced in the blowing tests.

"The Galesburg shale (no. 3) has a carbon-dioxide content of 21.3 per cent, and is, therefore, within the limits for a wool rock, and was blown without admixture. A slightly coarse, white wool was produced. (Rock wool B.)

"Wool rock C is a mixture including all the samples taken from the Morris quarry. Those above and below the Bethany Falls limestone are included in proportion to their thickness at the outcrop. The Bethany Falls limestone makes up 38 per cent of the total weight of the mixture in the raw rock. This selection would cause no difficulty in the mining operation since the Bethany Falls limestone would be mined and removed first. The balance could be mined without attention to proportions, and the 38 percent Bethany Falls limestone could be added at the plant. The above mixture fused easily in the crucible and produced a fine-white wool in the blowing test.

Data on Tests

Rock Wool No.	Approx. Temp. Blown	Steam Blast Lbs. per sq. in.	Fiber Diameters in microns			Color	Percentage of CO <sub>2</sub>
			Minimum	Maximum	Average		
A	1550°C.	60	2	68	7	White	22.74
B	1575°C.	64	2	56	10	White	21.3
C	1525°C.	60	3	30	5	White	27.01

"Remarks. The Morris outcrop is near the Santa Fe railroad. The city limit of Kansas City, Kansas is less than 3 miles distant. The gas supply for this area is obtained from local fields in Wyandotte and Johnson Counties, and is also piped in from the southwest."

Very truly yours,

Norman Plummer, Ceramist

J. M. Jewett, Geologist

Russell T. Rummels, Chemist

NP:bjh

The location of your quarry as given in the quote from the above report is given incorrectly in that report. The location should have been one-half mile east of Morris in Wyandotte County.

STRATIGRAPHIC SECTION SHOWING RELATIVE POSITION, THICKNESS,  
 AND LOSS ON IGNITION OF BEDS SAMPLED.

Sample number	Thickness of bed, feet	Stratigraphic name	Description of bed	Loss on ignition, percent
I	1.0	Dennis limestone	Limestone, gray, clayey	31.02
H	1.0	Dennis limestone	Shale, dark gray, calcareous	19.58
G	1.0	Dennis limestone	Shale, black, bituminous	27.91
F	2.2	Galesburg shale	Shale, gray, clayey	4.76
E	2.0	Galesburg shale	Shale, gray, nodular, calcareous	15.81
	12.0	Bethany Falls limestone		42.00
Mine Floor				
A	0.5	Hushpuckney shale	Shale, gray	14.41
B	0.5	Hushpuckney shale	Shale, gray	7.03
C	0.5	Hushpuckney shale	Shale, dark	7.42
D	0.5	Hushpuckney shale	Shale, dark	8.10

Chemical Composition of Samples from Mine of Thompson Crushed  
Rock Company

	Percentage of constituents in samples								
	A	B	C	D	E	F	G	H	I
Silica (SiO <sub>2</sub> )	46.83	55.60	35.66	56.78	42.15	63.39	42.85	44.14	21.39
Alumina (Al <sub>2</sub> O <sub>3</sub> )	8.45	13.04	15.24	15.19	13.42	17.94	14.67	19.07	7.17
Iron oxide (Fe <sub>2</sub> O <sub>3</sub> )	3.43	5.31	5.85	5.98	2.81	3.50	4.96	0.92	1.38
Titanium oxide (TiO <sub>2</sub> )	1.21	0.84	0.84	1.63	**	**	**	**	**
Calcium oxide (CaO)	10.71	4.25	2.86	2.07	17.92	1.45	1.64	5.44	25.57
Magnesium oxide (MgO)	3.82	2.15	1.73	1.30	1.39	1.80	2.41	1.88	10.95
Phosphorous pentoxide (P <sub>2</sub> O <sub>5</sub> )	4.11	2.94	2.54	3.21	0.06	0.02	0.88	3.19	0.12
Sulfur trioxide (SO <sub>3</sub> )	1.19	2.63	1.72	0.84	0.05*	0.05*	0.05*	0.05*	0.05*
Not determined (chiefly potassium and sodium oxides)	5.34	6.21	6.14	4.90	6.39	7.09	4.61	5.73	2.35
Loss on ignition	14.41	7.03	7.42	3.10	15.81	4.76	27.91	19.58	31.02
Totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

\* Or less

\*\* Titanium oxide (TiO<sub>2</sub>) with alumina