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PROPOSED STUDY OF WEATHERED GRANITES OF WISCONSIN

by

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PURPOSE OF STUDY

The primary purpose of this study is to assemble definite chemical and microscopic data regarding certain weathered granites. A secondary purpose is to discover criteria which will guide us in the search for disintegrated granite to be used as road material. For this reason we are interested more in the causes than in the products of weathering. It is apparent that even though the study is purely scientific, it may prove to be of considerable economic value.

In economic geology we study very carefully the factors favoring the deposition or formation of ore deposits. This study should have a similar slant. Granite everywhere is undergoing weathering. In Wisconsin we know that enormous amounts of granite have been weathered and carried away. In the majority of places but little of the weathered product is left. In certain places a larger amount of the weathered

granite is present. Is this due to local more rapid weathering which in turn is induced by (a) a special local mineralogical character of the granite, (b) by favorable structural features, (c) by favorable hydration conditions? Or is this due to the accident of preservation of weathered material, largely independent of the original rock character?

Location

The granites to be studied are all in the areas of thin drift or ~~entirely drift~~ no drift. Field work should be done in the following counties: Clark, Marathon, Taylor, Shawano, Wood, and Jackson. A large number of exposures should be examined and samples collected from the most instructive ones.

How about Waupaca Co? R HL

Disintegrated Igneous Rocks as Road Material

We have found that the best road material is produced by sufficient weathering of a coarse grained granite to produce disintegration. If the feldspars are badly weathered, the material is not so satisfactory. The deposits are most commonly on flat topped uplands, or on gentle slopes. So far as we have been able to determine, no direction of slope is favored. We

have been unable to account for the fact that one granite exposure does disintegrate while another apparently identical mineralogically, in structure, and in topography has not disintegrated. We have used some weathered syenite, fine grained granite, and diorite. As these rocks tend to break in angular fragments, none of them is so satisfactory as the coarse grained granite. We know of no case where weathered gabbro has been used but see no reason why such material would not be useful.

Suggested Field Observations

Structural

Joints.-These should be studied and mapped in detail. Is there any evidence that joints are more numerous in the weathered rock? To what extent has weathering proceeded laterally from joints? Are there masses of solid rock surrounded by weathered rock? Were these masses different originally from the weathered portion, or is their preservation due to more widely spaced joints? We are told that these bowlders, if hauled off to one side, "slack" in a relatively short time, rather clearly indicating that the bowlders have lost their crystal bond.

bowlders blast and crush much more easily than fresh rock. The engineers report that all of these

Dikes.-Dip and strike, relation to weathering.

Sheeting.-"Rift," "run" or "grain". In the Neillsville pit, marked gneissic structure is shown in the weathered rock. This is not nearly so apparent in the fresh rock nearby.

Weathering

1. Depth.-(a) Relation to water table. In some cases weathered granite is worked below the water table. Our impression now is that a large proportion of the pits are above the water table. The suggestion has been made that the granite was weathered with reference to a relatively lower water table.

(b) Relation to frost action. We find in some cases that all the easily excavated material has been taken out of a pit. Later they were able to come back and excavate several feet more. This has been attributed to frost action. In numerous pits the granite is weathered considerably below

the depth of frost action. Dr. W. suggests that special local climatic conditions may favor disintegration. To illustrate the exposure may be such that snow does not lodge and the deposit is therefore subjected to more severe disintegrating conditions,

(c) Overburden. Thickness and character. The general experience is that a tight cover of residual clay serves as a roof, increasing the run-off and retarding the process of weathering.

(d) Vegetation. Type and probable relation to run-off, and to weathering.

Petrogeny

Minerals.-If an unweathered outcrop is near, compare this with the weathered deposit to determine what mineral present or absent explains this difference. In a gabbro outcrop the weathering was clearly related to the presence of pyrite. Has the weathering of minor amounts of the ferric minerals resulted in volume changes which favored disintegration?

Physiography

This question must be given careful study. Describe the topography in detail: Local relief; relation to stream valley and to divide; in glaciated region location of weathered material with reference to protective rock ledge and to direc-

tion of ice movement. Is weathered material on a slope or on a flat? What topographic features have favored formation and preservation of weathered rock?

Laboratory Work

1. Chemical analyses

   (1) Fresh rock

   (2) Partly weathered rock

   (3) Well weathered rock

2. Microscopic work.-Thin sections to correspond with (1),(2), and (3) above. Determine mineral composition, size and percentage of each. In addition make observations on fresh rock specimen and thin section: open cracks; cleavages and twinning lines curved from pressure; evidence of strain and fracture; parallelism in orientation; alteration; inclusions. A comparative study should be made of a granite which disintegrates with another in close proximity which does not disintegrate, in spite of the fact that the two appear to be identical in character.

3. Study of polished surfaces.

4. Determination of porosity.

Collections

As indicated above we shall need to collect from each deposit studied:

1. Three samples for chemical analysis. Three mineral samples, collected as in an ore deposit, and quartered down.
2. Three hand specimens. For the thoroughly weathered material, bags should be provided.

A duplicate set of samples and specimens should be collected and sent to Madison.

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G. F. 173.

SUGGESTED LIST OF LOCALITIES TO BE VISITED

Should sample only the most interesting of these.

Clark County

County pit at Neillsville in SE. 1/4 SW. 1/4 sec. 10 T. 24, R. 2 W on north side of Black River. Gneissic granite

Taylor County

SW. 1/4 SW. 1/4 36, T. 31, R. 1 E. on south side of Little Black River. Red granite and gneissic granite. Pit developed by town of Deer Creek.

Marathon County

Pit in NW. 1/4 NW. 1/4 sec. 2, T. 27, R. 2 E. Location 6 on road material map.

Pit in SE. 1/4 NW. 1/4 sec. 2, T. 27, R. 2 E. Location 7 on road material map.

Pit in SW. 1/4 SE. 1/4 sec. 14, T. 27, R. 4 E. Location 48 on road material map.

Pit in SE. 1/4 NE. 1/4 sec. 14, T. 27, R. 4 E. Location 49 on road material map.

Pit in SW. 1/4 SE. 1/4 SW. 1/4 sec. 20, T. 27, R. 4 E. Location 50 on road material map.

Pits on the line between sections 17 and 20, T. 29, R. 10 E. Location 38 on road material map. An excellent opportunity to compare disintegrated granite with exposures of fresh granite of similar type.

Pit 1/2 T. north of SE. sec. 22, T. 29, R. 6 E.

Pit 5 T. north and 2 T. west of S. 1/4 corner 12, T. 28, R. 4 E.

Pit 5 T. south of N. 1/4 36, T. 30, R. 8 E.

From E. 1/4 sec. 24 to north town line of T. 27, R. 5 E.

Wood County

Near Vesper

Brick clay pit 4 T. east of S. 1/4 12, T. 23, R. 4 E.

Road material pit north of diagonal road about 5 T. south and east of W. 1/4 corner 12, T. 23, R. 4 E.

Jackson County

Pit just east of Hatfield dam.

Shawano County

Disintegrated granite has been worked near Tilleda, T. 27, R. 13 E.