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State Department of Geology and Mineral Industries

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REPORT ON SAMPLES OF KEASEY SHALE SUBMITTED BY
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Two samples of Keasey shale were submitted to the Department to determine, if possible, any difference between them. The samples were labeled Keasey Shale No. 7 and Empire Quarry No. 1. The tests by the Oregon Portland Cement Company reportedly show a marked difference between the two samples when tested as a pozzolanic additive for cement.

The samples were first examined with a petrographic microscope to determine the mineralogy. Then the samples were broken down using sodium thiosulphate and separated into coarse and fine fractions by settling. The approximate grain sizes were estimated by rates of settling. The fine fractions were then checked by differential thermal analysis to determine which, if any, clay minerals were present in appreciable amounts. Results of these tests are shown in the tabular listing on page 2.

Keasey formation

A summary of the geologic setting near Sunset Tunnel is appropriate to this report because of the lithologic variations within the Keasey formation.

The Keasey formation has been divided into three units on the basis of fauna and lithology (Deacon, 1953). The lower member is dark bluish-gray, tuffaceous, fossiliferous, sandy siltstone. Concretions are usually abundant as round and nodular forms from several inches to 3 feet in dimension. Hard concretionary lenses are common and form resistant ledges. Glauconite occurs in lenses infrequently but is disseminated throughout most of the formation.

COMPARISON OF KEASEY SHALE FOR OREGON PORTLAND CEMENT COMPANY

No. 1, Empire Quarry

No. 7, Keasey Shale

Megascope Description

Fine-grained, medium-greenish-gray tuffaceous siltstone.

Medium-grained light-olive-gray tuffaceous siltstone.

Microscopic Description

Composed mainly of fragments of weathered devitrified glass. Other constituents in order of decreasing abundance: clear angular glass shards, broken quartz, and feldspar crystals with minor amounts of glauconite and basic minerals. Fragments generally fine grained.

Same.

Fragments generally medium grained.

Differential Thermal Analysis

Percentage of clay too low to be diagnostic.

Same.

Settling Test

Medium silt-sized particles - 65%
Fine silt sized particles - 35%

Medium silt-sized particles - 90%
Fine silt-sized particles - 10%

Limestone lenses are also known from the lower Keasey. The lower Keasey beds occur in Rock Creek and in the Nehalem River a few miles north of Sunset Camp. The thickness varies from 170 feet to at least 500 feet.

The middle member is lighter colored and contains more tuff than the lower member. It is separated from the lower member by a sharp lithologic contact of pebble conglomerate about 5 feet thick. The lower 400 feet of the middle member is variable and ranges from conglomerate and sandstone to siltstone. The upper 1200 feet of the middle Keasey is medium-gray, tuffaceous sandy siltstone, generally more stratified and homogeneous. It is this material which crops out in the vicinity of Sunset Tunnel.

The upper Keasey is separated from the middle unit by a change in fauna and probably not recognized in the field by lithology. If the upper Keasey occurs in the Sunset Tunnel area it has not been distinguished.

Conclusions and recommendations

Test results previously listed in this report indicate that the only detectable differences between the samples is that Sample No. 1 has a higher percentage of fine-grained material than has No. 7. Neither sample contained appreciable sand or clay, therefore the difference occurs within the silt range of 1/16 to 1/256 mm.

Brandenburg (1951) states that grain size is an essential characteristic of pozzolan. It is probable that certain areas of Keasey shale will be satisfactory as pezzolanic material. Field investigations by a geologist familiar with the formations in the area is recommended, for by laterally tracing out the horizons of satisfactory material he could delineate the optimum areas for sampling.

BIBLIOGRAPHY

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