QUADRANT FORMATION AND PERMIAN STRATA
IN THE PHILIPSBURG (MAXVILLE) AND
GARRISON DISTRICTS

By

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GENERAL

Permian and Pennsylvanian strata in western Montana are often poorly exposed. It is usually impossible to obtain complete sections from natural outcrops. Underground workings of phosphate mines in the Maxville and Garrison districts do, however, serve to provide continuous sections. A comparison of the sections as studied in each locality should therefore be of interest and is shown in the following tables.

It may also be of interest to note that one of the best guides to phosphate mapping and exploration is provided by the manner of outcrop of these formations. The upper Quadrant quartzite commonly forms a well defined hogback or ridge elongated along the strike. Across a narrow covered interval this ridge frequently is paralleled by a series of similar hogbacks which express the exposure of the hard, quartzitic or cherty upper strata of the Permian. Within and along the covered interval, the occurrence of phosphate "float" usually provides conclusive evidence of the presence of the phosphate member, which is almost never exposed in natural outcrop.

QUADRANT FORMATION

The Quadrant is divisible primarily into an upper quartzitic member and a lower dolomitic siltstone-sandstone member (Table 1). There is little appreciable change in the lithology or thickness of the formation between the Maxville and the Garrison districts. Specific sections may, however, indicate some variation in the thickness of the lower Quadrant. This would seem to be primarily the result of structural features, but may also indicate some depositional variations. Broadly speaking, the lower Quadrant of the Maxville area contains more sand and coarser-grained size throughout the section than is typical in the Garrison district. It also is possibly somewhat less dolomitic. The only notable difference in the upper quadrant of the two districts is the development in the Maxville area of more and better defined bedding planes.

The "spotted dog" zone indicated in Table 1 is a distinctive quartzite that is dark-colored with small one-half to one inch, round, white spots. The spots commonly contain numerous microscopic voids not present in the darker quartzite. Surface float

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