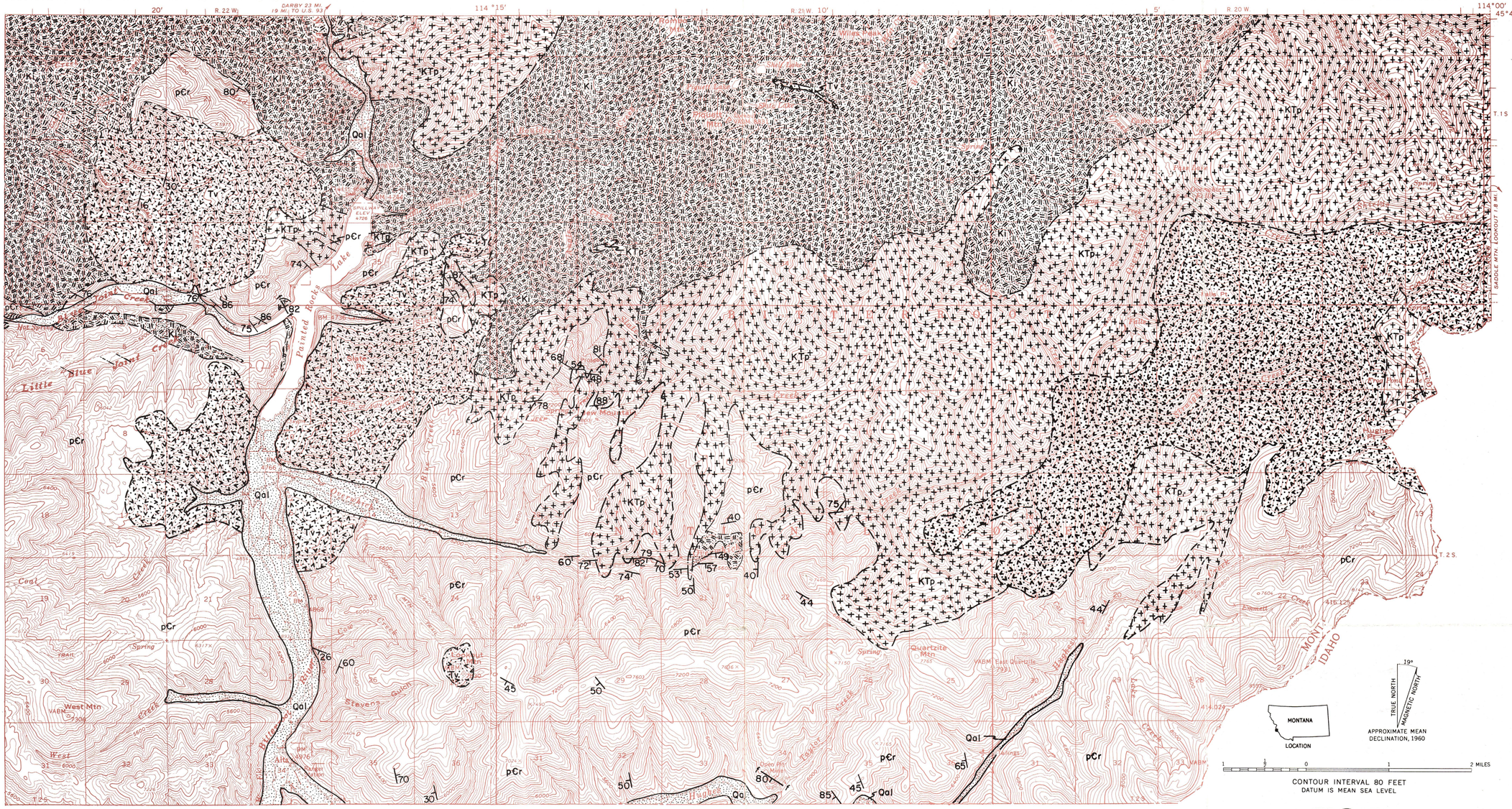

EXPLANATION

QUATERNARY — Qal — Alluvium (sand and gravel)

TERTIARY — Tv — Volcanic rocks, rhyolite dominant

TERTIARY OR CRETACEOUS — KTp — Porphyritic shallow intrusive bodies, mainly of quartz latite composition

CRETACEOUS — Ki — Idaho batholith or associated plutons of granitic to granodioritic composition

PRECAMBRIAN — pCr — Quartzite of Ravalli Group, Belt (Precambrian), locally faintly gneissic, as along Blue Joint Creek

Attitude of fault

Attitude of bedding

Numerous dikes

PAINTED ROCKS LAKE AREA, SOUTHERN RAVALLI COUNTY, MONTANA

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INTRODUCTION

Field work on this project was carried on for eight weeks during the summer of 1965 by Robert L. Rees and the writer, and for a similar period during the summer of 1966 by T. J. Harriss and the writer. Dr. Richard B. Berg and his assistant, Mike Chapman, and I spent four weeks in July and August 1967 traversing and examining some of the less accessible parts of the map area. Mr. Uuno M. Sahinen visited the area during the latter part of July 1967.

The map area extends north to the north edge of the Painted Rocks Lake and the Piquett Mountain 15-minute quadrangles at lat 45°45' N., and east to the eastern edge of the Piquett Mountain quadrangle or to the Montana-Idaho state line where this lies within the quadrangle. The western boundary of the map area is the western edge of R. 22 W., and the south boundary is the south line of T. 2 S. The area extends south up the West Fork of the Bitterroot River from a point about 2¼ miles below the Painted Rocks Lake dam almost to the junction of Hughes Creek with the West Fork near Alta, and includes approximately 168 square miles.

The only detailed geologic mapping near the area is that in the vicinity of Sheep Creek and Beaver Creek approximately 5 miles farther south (Crowley, 1960).

The area was selected for geologic mapping and examination because of its location within or adjacent to the "border zone" of the Idaho batholith and because of former placer gold mining along Hughes Creek. Early prospecting in the area, probably stimulated mainly by the gold mining activity, centered on a search for gold, and it seems possible that other metals and minerals may have been overlooked. Some copper has been produced near Slate Creek, and a few other minerals have been reported; for example, fluorspar along Overwhich Creek (Sahinen, 1957).

The original plan was to map geology on air photos, but detailed examination of air photos showed that ground traverses were necessary to establish contacts and lithology. On the air photos, the outcrops of hard dense quartzitic Belt rocks (Precambrian) appear similar to those of the igneous rocks. Furthermore, most of the terrain is covered with dense stands of timber or second growth trees and underbrush, which conceal structure and contacts on air photos. Consequently, it was necessary to cover as much of the ground as possible on foot.

EXISTING MAP

The geologic map of Montana (1955) is the only known published geologic map of the area, and it shows only two major units in the area. The southern part is mapped as Belt sedimentary rocks (Precambrian), and the northern part as the Idaho batholith. An isolated patch of Tertiary volcanic rock is shown at the junction of Overwhich Creek and the West Fork, a central tongue extending west on the west side of the main stream. In the central part of the area, the map also shows several elongate Tertiary dikes, which trend northeast.

GEOCHEMICAL TESTS

Geochemical tests were made on 33 samples of stream sediment collected on the West Fork of the Bitterroot River and its tributary streams. Heavy-metal geochemical analyses were made on 106 samples collected by D. C. Lawson on logging roads and forest roads in the Slate Point-Overwhich Creek area.

The geochemical surveys showed only two samples that are of possible significance. These contained 180 ppm of molybdenum compared to values of 40 to 80 ppm regarded as not significant. These anomalous samples were a stream-sediment sample from West Creek near its junction with the West Fork and a stream-sediment sample from HughesCreek near Alta. Results of all analyses are on open file in the offices of the Montana Bureau of Mines and Geology.

GEOLOGY AND PETROLOGY

In most of the southern part of the mapped area, Ravalli Quartzite (Precambrian) and related rocks crop out, but in places they are covered by irregular fingers of Cretaceous and Tertiary volcanic rocks on the east side of the West Fork of the Bitterroot River. Most of the quartzite is fairly pure quartz, and in general the beds do not show marked metamorphism.

The igneous rocks in the northern part of the map area constitute a most interesting and varied assemblage. Throughout much of the area, and especially to the north, rhyolitic dikes may be seen as ledges or "walls" above the slopes and ridges, the less resistant host rock having been preferentially eroded away.

Much of the material mapped as Tertiary volcanic rock consists of tan rhyolite containing phenocrysts of quartz or sanidine as the only visible crystals in an aphanitic groundmass. Small cubic casts, believed to be vestiges of pyrite crystals that have weathered away, are fairly common. The Saddle Mountain Lookout, a mile east of the map area, stands upon such a rhyolite outcrop. Lookout Mountain, about 2 miles east of the West Fork road in sec. 25, T. 2 S., R. 22 W., is of similar rhyolite.

Pink granite or quartz monzonite is prominent on both sides of the West Fork of the Bitterroot River and eastward across Rombo Mountain and beyond. In addition, there is gray porphyritic quartz monzonite, the more porphyritic phase of which attains great prominence on and near Piquett Mountain. Little Boulder Creek marks the boundary between the gray and the pink phases in sec. 20, T. 1 S., R. 21 W., and the course of this stream below Piquett Mountain is believed to be controlled by the contact between these two intrusive masses.

Several dark dikes intrude the metamorphic rocks and the coarser igneous rocks. In some of these dikes there is a gradation from darker outer zone to lighter core or central portion. One such dike or sill, to be described later, crops out on the east rim of the cirque a few hundred yards south of the top of Piquett Mountain. Another such dike is exposed above the road north of the Alta turnoff near the Alta Big Tree. Both of these dikes show a darker contact or chill border, which grades to a lighter shade toward the center of the mass. A third such dike, less well exposed, occurs between Trout Creek and Overwhich Creek at their junction in sec. 14, T. 2 S., R. 21 W.

Obsidian or pitchstone flows have been exposed on logging roads near the tops of the high ridges on both sides of the West Fork of the Bitterroot River. The outcrop on the ridge on the west side of Painted Rocks Lake cuts across the logging road near the southwest corner of sec. 27, T. 1 S., R. 22 W. The exposure east of the river is southeast of Slate Point in a road cut in the northeast corner of sec. 11, T. 2 S., R. 22 W. Because of a mantle of debris and soil in these areas it has not been possible to map the flows. The glassy nature (index of refraction approximately 1.503) and flow texture of these bodies are evidence of their effusive origin.

Numerous patches of tuffs and tuff breccias or agglomerates cover much of the area, especially east of the West Fork. One of these, which may be classed as a mud flow, was first noted by Dr. H. W. Dresser as a large boulderlike mass cropping out above the road a few hundred feet north and west of the Slate Creek campground turnoff. This flow forms a nearly horizontal ledge or outcrop on the south-facing slope of the valley of Slate Creek a few yards above the Slate Creek road. Large boulders and rubble have weathered from the ledge and are strewn along the road for a distance of half a mile or more. Massive agglomerate of similar appearance is exposed near the trail above Overwhich Creek in sec. 7 T. 2 S., R. 20 W.

An interesting volcanic rock crops out a few hundred feet downslope from and south of a fire lookout (now abandoned) on Slate Point. Here siliceous and tuffaceous volcanic deposits of various colorations form cavernous and pockety masses suggestive of an extinct fumarole or hot spring.

HYPABYSSAL INTRUSIVES

The rocks mapped as Cretaceous or Tertiary porphyries (KTp) are dominantly quartz latite. Some occur as dikes or sills, whereas others crop out over wide areas and because of their textures are believed to be shallow intrusive bodies. Typically these porphyries are characterized by phenocrysts of potassic feldspar as much as an inch in cross section. Conspicuous euhedral to subhedral plagioclase crystals and clear glassy anhedral rounded or embayed quartz crystals are also contained in the greenish groundmass. As seen under the microscope, much of the groundmass shows spherulitic texture with small radiating crystals surrounding phenocrysts.

Among intrusive rocks believed to be related to the larger masses are rocks identified in thin section as quartz latite granophyre. A dike of this type intrudes the quartz monzonite on the rim of the cirque south of the former lookout on Piquett Mountain (19-7)*, and a similar dike appears a short distance below Piquett Lake (21-2). On the ridge approximately ¾ mile southwest of Rombo Mountain, a fine-grained aplite dike cuts the coarser quartz monzonite (20-3).

Dacite and rhyodacite porphyries are included in the hypabyssal grouping. On Prayer Creek, at the north edge of the map area, rock classed as dacite porphyry (12-15) crops out, and slightly west of it is a body of rhyodacite porphyry (17-5).

Other quartz latite porphyry dikes are those in the northwest part of the map area just south of the center of the north line of sec. 31, T. 1 S., R. 22 W. (1-12), and on Tough Creek west of the west line of sec. 18, T. 1 S., R. 22 W. Similar shallow intrusive bodies appear just north of Porcupine Creek near the southeast corner of sec. 10, T. 1 N., R. 20 W. (16-11), and south of Warm Springs Creek just west of the west line of sec. 15, T. 1 S., R. 20 W. (18-4).

*Numbers in parentheses refer to samples on file with air photos or file maps that show the exact location.

PLUTONS

Rocks of plutonic origin, as evident from their occurrence and their granitoid texture, are mapped as Idaho batholith (Ki) because of their location within or on the border of the batholith and because of their obvious relation to the batholith. These granitoid rocks are somewhat diverse.

Typical pink granite (24-1) can be seen along the West Fork road about a mile below the gaging station north of the West Fork dam, close to the middle of sec. 23, T. 1 S., R. 22 W. The granitic textured rock on the road east of the dam is quartz monzonite (24-2). Fine-grained miarolitic granite occurs just west of Piquett Lake (20-13). Quartz monzonite (20-6) showing rapakivi texture crops out on Rombo Mountain in close association with typical quartz monzonite similar to that west of Piquett Lake (20-7).

Quartz monzonite porphyry is perhaps the most striking of the plutonic rocks in the area. Perthitic alkali feldspar megacrysts as large as 35 mm are very prominent; many of these crystals show Carlsbad twinning. Throughout the groundmass of these porphyries (19-1 and 19-9), smaller phenocrysts, of 4 mm or less, are common. These quartz monzonite porphyry bodies are particularly spectacular on Piquett Mountain and on the cirque ridge south of the former lookout. Quartz monzonite porphyry of somewhat less striking character crops out in the northwest corner of sec. 22, T. 1 S., R. 22 W. (3-15 and 3-16B).

GNEISS

The only gneiss encountered within the map area was near the southwest corner of sec. 31, T. 1 S., R. 22 W., on Blue Joint Creek. This gneiss seemingly is metamorphosed Ravalli Quartzite, which must be somewhat more impure than most of the quartzite farther south and east. Metamorphic minerals observed in the gneiss include muscovite, biotite, kyanite, epidote, and sphene.

STRUCTURE

There has been no attempt to map faults or other structural features in the area. The drainage patterns of several streams are believed to be fault controlled, however.

Dr. H. W. Dresser, after a study of air photos and the topographic maps of the area, pointed out instances of stream capture and drainage control associated with faulting. The dominant directions of streamflow, as le points out, are northeast-southwest and northwest-southeast, and it is thought that these directions may be related to an obscure fault or joint pattern. Many of the streams in the area exhibit sharp changes in direction of flow consistent with these directions. An example of stream capture is that of Overwhich Creek, which above the falls flows northwest and at one time continued in that direction into the present Fault Creek drainage via Pass Lake and Capri Lake. Later it abruptly changed its course at the falls and assumed a path about at a right angle to its original direction; it now continues southwest from the falls. Other streams that exhibit marked directional changes believed to be associated with faulting are Hughes Creek, Slate Creek, Boulder Creek, and many of the tributaries of these streams.

ECONOMIC OUTLOOK

Hughes Creek was a source of placer gold production of record from 1904 to 1952, the largest production being in 1941 (Sahinen, 1957). There has also been some placer mining of gravels on a bench above and to the north and west of Hughes Creek. More recently a small open cut has intersected an old adit in sec. 34, T. 2 S., R. 21 W., above Taylor Creek at a point approximately half a mile above its confluence with Hughes Creek. A small mill has been erected on the property but this mill has not operated recently.

Above Slate Creek, at or near the contact between Precambrian quartzite and igneous rocks, there are several prospects, at one of which a short adit has been driven a hundred feet or more into the south wall of the canyon above Slate Creek. Some mineralized rock was observed on the dump. Sphalerite (yellow or light tan), galena, and pyrite or chalcopyrite were noted in this dump material.

Tungsten has been reported along Slate Creek (Sahinen, 1957), but its occurrence was not verified.

Two or more pockets of copper ore have been opened on the south side of Slate Creek, and ore has been selectively mined from these small pits.

Copper staining on fairly prominent ledges above and on the east side of Drop Creek, near the point where it falls precipitously before crossing the Overwhich Trail, would seem to bear investigation. Traces of copper staining were observed at several points in the vicinity of Overwhich Falls.

An outcrop of fluorspar, already mentioned, was seen in a prospect less than a hundred feet above Overwhich Creek slightly east of the east line of sec. 16, T. 2 S., R. 21 W.

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