UNITED STATES DEPARTMENT OF INTERIOR

GEOLOGICAL SURVEY

MINERAL RESOURCE POTENTIAL OF THE OLALLIE ROADLESS AREA, MARION AND JEFFERSON COUNTIES, OREGON

By

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Open-File Report 82-885

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature

1982

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-557, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geologic and mineral resource potential survey of the Olallie Roadless Area (6099) in the Mt. Hood National Forest, Marion and Jefferson Counties, Oregon. Olallie Roadless Area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U. S. Forest Service, January 1979.

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SUMMARY

The Olallie Roadless Area, Marion and Jefferson Counties, Oreg., is devoid of mines and mineral prospects. The results of this mineral resource appraisal indicate that there is little likelihood that commercial deposits of metallic or nonmetallic minerals will be found in the area; low-value rock for construction purposes is present, but better and more accessible deposits are present in adjacent areas.

There is no evidence that mineral fuels are present in the area. Nearby areas in Clackamas, Marion, Jefferson, and Wasco Counties are characterized by higher-than-normal heat flow and by numerous thermal springs, some of which have been partly developed. This may indicate that the region has some as yet undefined potential for the development of geothermal energy. Lack of thermal springs of other evidence of localized geothermal anomalies within the roadless area may be the result of masking by young, nonconductive rock units and by the flooding out and dilution of rising thermal waters by cool meteoric water.

INTRODUCTION

This report describes briefly the geology and mineral resource potential of the Olallie Roadless Area (RARE II area 6099), that is being considered for inclusion in the Wilderness system. The area of study incorporates a largely undeveloped part of the High Cascade Range along and just west of the Cascade crest. The area is bounded on the north and northwest by a power transmission-line corridor, and on the southeast, south, and east by Skyline Road, which provides access to Breitenbush, Olallie, and Monon Lakes. The roadless area is named for Olallie Butte, a high andesitic volcano that is contiguous with, but outside of, the roadless area on the northeast.

A reconnaissance geologic map was made of the area and stream-sediment and bedrock samples were collected for both detailed mineralogic and X-ray diffraction studies and for chemical analyses. Systematic geochemical sampling was determined to be impractical largely because the area is covered by a very extensive veneer of glacial detritus derived from terranes outside of the roadless area and, hence, not geochemically representative of the bedrock. Some additional geologic mapping and sampling were done in areas immediately contiguous to the roadless area to better understand the distribution of rock units and their lithologic variations in order to make more meaningful inferences regarding the mineral resource potential.

Prior to the present study, the geology of Olallie Roadless Area was mapped in broad reconnaissance by Thayer (1939) as part of a regional study of the geology and petrology of a large segment of the north-central Cascade Range in Oregon. Hammond and others (1980) prepared a "Guide to the geology of the upper Clackamas and North Santiam Rivers area, northern Oregon Cascade Range," which included the Olallie Butte area in broad reconnaissance, and

White (1980) briefly discussed the geology of the Breitenbush Hot Springs quadrangle, which incorporates all of the roadless area.

LOCATION AND GEOGRAPHY

The Olallie Roadless Area is located in Mt. Hood National Forest, in northwest- to north-central Oregon along and immediately west of the crest of the Cascade Range; Mount Jefferson Wilderness lies adjacent on the south. The area is mostly in Marion County, but extends a short distance into Jefferson County (fig. 1).

The area is irregular in shape and consists of about 13 mi^2 ($\approx$34 km^2) that is characterized by gently sloping upland surfaces surmounted by small volcanic cones mostly less than 300 ft (100 m) high. The southwest border of the area is along the steep canyon wall of the North Fork of the Breitenbush River.

Skyline Road, which is mostly poorly maintained, provides access from paved roads in the Clackamas and Breitenbush River drainages to trails entering the south and eastern margins of the roadless area and to camp grounds at Breitenbush and Olallie Lakes. Logging spur roads provide access to trails entering the northern part of the area.

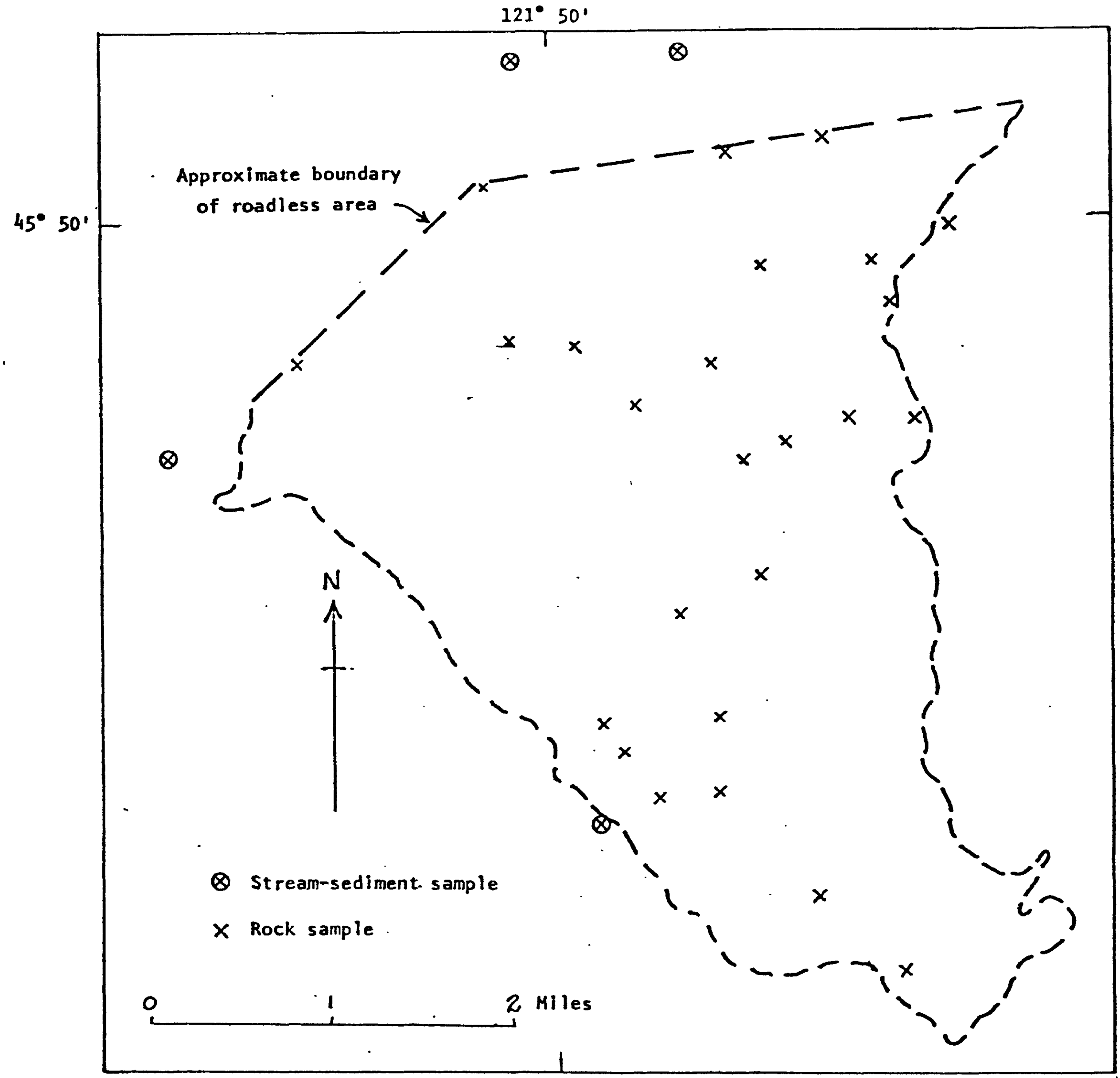
GEOLOGY

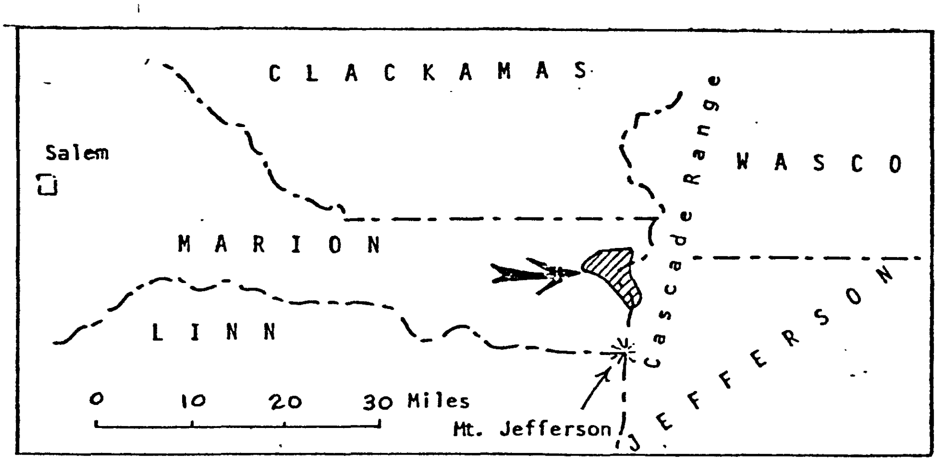
All of the rocks in and near the Olallie Roadless Area are of Cenozoic age (fig. 2) and include principally basaltic andesite and andesite flows and and flow breccias, as well as volcanic vent accumulations, all part of the stratigraphic sequence generally referred to as "volcanic rocks of the High Cascade Range." Much of the area is buried under a veneer of glacial till.

Most of the study area is underlain by fresh flows and flow breccias of light- to dark-gray hypersthene, clinopyroxene, or olivine basaltic andesite, or locally, platy, pyroxene or olivine andesite. Nearly all of these rocks are porphyritic and contain phenocrysts of these varietal minerals as well as abundant phenocrysts of labradorite or calcic andesine and rarely, magnetite. In a few places the olivine is only slightly altered to iddingsite on crystal margins, but otherwise these rocks show no evidence of alteration. Magnetic polarity measurements indicate that all these rocks are normally (N) polarized, strongly suggesting that they are all less than a million years old and thus Pleistocene in age.

Vents for the flows and breccias occur both in and marginal to the roadless area and consist of cinder cones, small lava cones from which cinders have been largely removed by erosion, and dikes. Cinder cones are composed of grayish-red oxidized cinders, scoria, agglomerate, and minor small flows mostly of porphyritic basaltic andesite or, locally, of black and yellowish-brown to dark yellowish orange, partly palagonitized basaltic andesite ejecta. Cones composed of the black and orange ejecta probably represent eruption into wet ground or, more likely, into snow fields where the fragmental material was rapidly chilled and remained essentially unoxidized.

Areally restricted domelike masses of unaltered, somewhat scoriaceous, grayish-pink to light-brownish gray hornblende dacite are exposed at Double





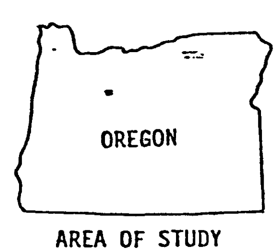
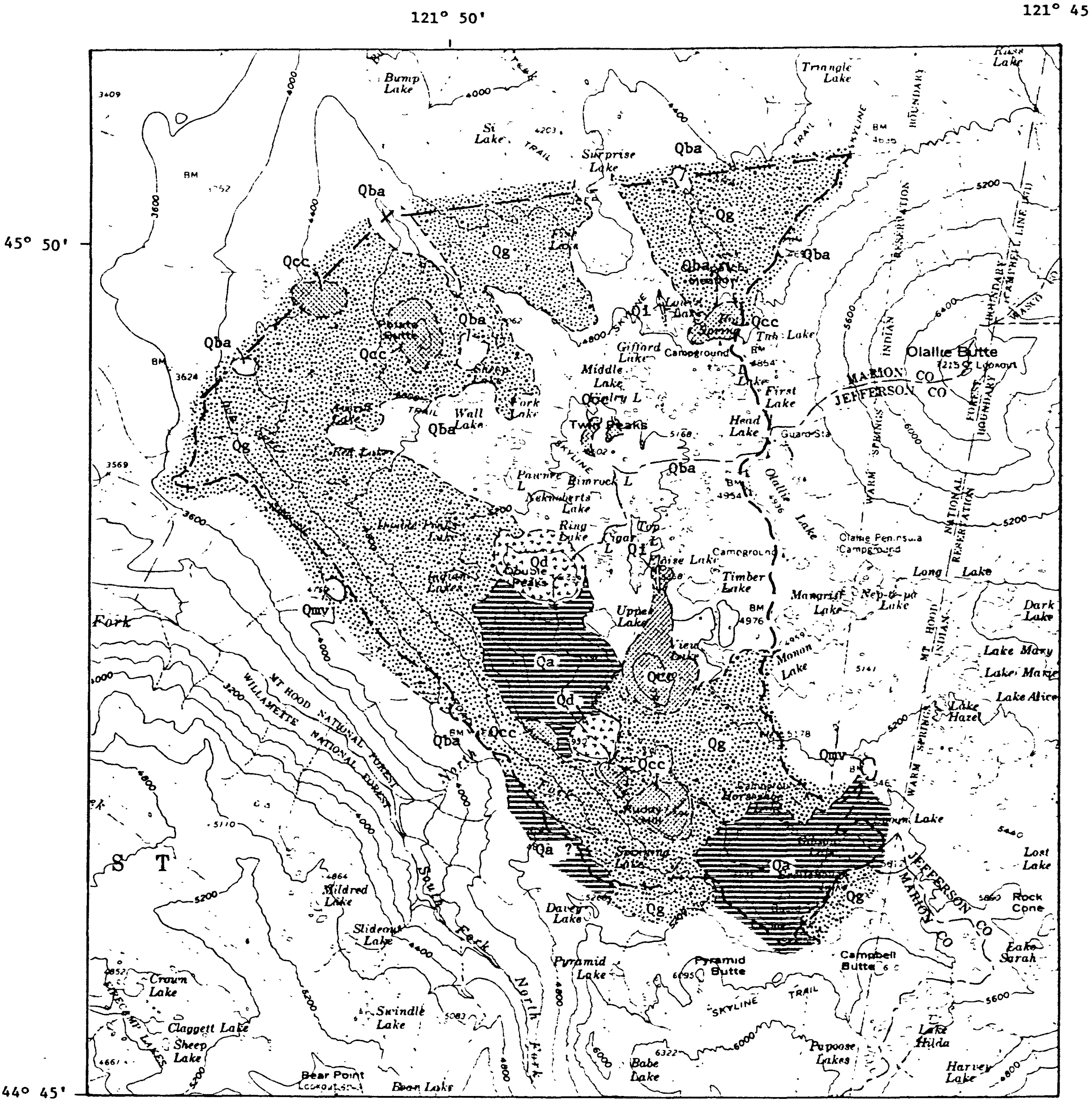


Figure 1.--Index map and sample-locality map of Olallie Roadless Area, Marion and Jefferson Counties, Oregon.



Base from U.S. Geological Survey
1:62,500 Breitenbush Hot Springs
quadrangle, 1961

Geology by George W. Walker
and David R. Sherrod,1981

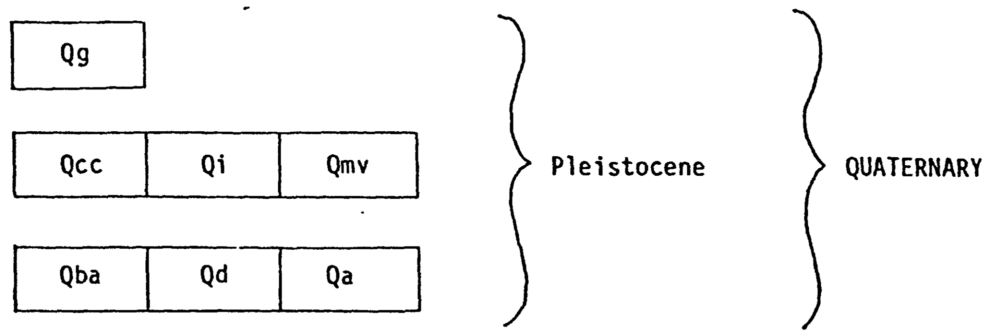
Scale

1 0 1 2 Miles

1 0 1 2 3 Kilometers

Figure 2.--Geological map of Olallie Roadless Area, Marion and Jefferson Counties, Oregon.

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qg — GLACIAL TILL--Composed of blocks and rock flour derived from basaltic andesite, andesite, and dacite of the High Cascade Range

Qcc — CINDER CONES--Vent ejecta composed mostly of cinders, scoria, and agglutinate of basaltic andesite and andesitic composition. Includes reddish oxidized fragmental material, as well as some black and yellowish-orange chilled and palagonitized ejecta

Qi — INTRUSIVES--Dikes of basaltic andesite or andesite

Qmv — MAFIC VENTS--Composed mostly of basaltic andesite; cinders and scoria largely missing, partly as a result of glacial erosion

Qba — BASALTIC ANDESITE--Flows and flow breccias of labradorite- and hypersthene-, or olivine-, or clinopyroxene-phyric basaltic andesite and minor olivine andesite. Uniformly fresh and unaltered, although some olivine crystals peripherally altered to iddingsite. In part intra-canyon fillings. Represents volcanic rocks of the High Cascade Range; polarity measurements on a number of different flows of unit are all normal (N), indicating that unit is probably all less than 1.0 m.y. old. Several chemical analyses of basaltic andesite collected from within Olallie Roadless Area are given by White (1980)

Qd — HORNBLENDE DACITE--Plagioclase- and hornblende-phyric dacite in areally restricted dome-like masses. Commonly scoriaceous; pinkish-gray in color. Hornblende is dark reddish brown and commonly peripherally and locally internally altered to magnetite and reddish iron-oxides (hematite ?). Chemical analysis (Thayer, 1937) on sample from Double Peak indicates: $SiO_2 \doteq 66.93$ percent, $Na_2O = 4.59$ percent, and $K_2O = 1.74$ percent

Qa — HORNBLENDE-PYROXENE ANDESITE--Flows and flow breccias of labradorite-, hornblende-, and clinopyroxene-phyric andesite. Includes some platy pyroxene andesite.

CONTACT--Approximately located

APPROXIMATE BOUNDARY OF ROADLESS AREA

Peaks and the unnamed rounded hill west-southwest of View Lake. The dacite contains fairly abundant phenocryst of andesine and dark reddish-brown basaltic hornblende, which, in thin section, is commonly shown to have been thermally baked and altered on crystal margins to magnetite, reddish iron-oxides, presumably mostly hematite, and other unidentified alteration products.

Glacial till composed of angular blocks of basaltic andesite and andesite suspended in a matrix of fine-grained rock flour covers about 50 percent of the roadless area. In a few places this veneer is thin and small bedrock outcrops project through it, but elswhere it is several tens of feet (≈10 m) thick, completely obscuring the underlying rocks. Source of the glacial till is not known, but it is mostly and perhaps entirely from outside of Olallie Roadless Area; presumably it is derived largely from areas of high elevation lying to the south along the crest of the Cascade Range near and north of Mt. Jefferson. On some slopes and in stream beds the fine-grained rock-flour matrix of the till has been completely removed by erosion leaving a lag of coarse blocks of basaltic andesite and andesite.

MINERAL RESOURCES

The Olallie Roadless Area is in a region of low mineral potential for metallic-mineral resources. There is no past record of either mining or quarrying within the area nor were any occurrences of metallic minerals, prospect pits, or claims recognized during the present investigation. Hot springs in areas adjacent to the roadless area suggest that there may be some undetermined potential for the development of geothermal energy.

The nearest metallic-mineral occurrences include mercury deposits in the Oak Grove Fork area of the Clackamas River (Brooks, 1963), located about 12 miles (≈20 km) north-northwest of the roadless area. Approximately 180 flasks of mercury were produced from several mines in the area during the 1932-43 period. Mercury mineralization has been reported also from hot-spring travertine terrace deposits at Breitenbush Hot Springs about 6 mi (≈10 km) to the southwest, but there is no record of production from these occurrences. Both of these mineralized areas are in Miocene and older volcanic rocks, all very much older than rocks exposed in the Olallie Roadless Area. The older rocks are more intensely faulted and fractured; they also are locally altered and mineralized with calcite and zeolites. Geologic conditions similar to those found in the two mineralized areas may exist at depth beneath the thick cover of Pleistocene flows and flow breccias that characterize the roadless area, but there is neither geologic nor geochemical evidence to support such a supposition. Panned, heavy-mineral concentrates of several stream-sediment samples (fig. 1) contain only rock-forming minerals derived largely, if not entirely, from glacial till that originated outside of the roadless area. The panned concentrates consist of olivine, magnetite, hypersthene, clinopyroxene, hornblende, and minor amounts of hematite(?); neither cinnabar nor any other mercury-bearing minerals were found in these concentrates.

Some of the volcanic cinders (scoria) within the Olallie Roadless Area are suitable for use as road ballast or surfacing and possibly as lightweight concrete aggregate. Because this low-value rock material is abundantly present in more accessible deposits in nearby areas, it appears to be of no commercial interest in 1981 or in the foreseeable future.

ENERGY RESOURCE POTENTIAL

Insofar as can be determined from surface geologic features, there is no evidence that the Olallie Roadless Area contains deposits of mineral fuels, although it may contain a small potential for the development of geothermal energy. There are no thermal springs within the roadless area, but several hot springs are present in nearby areas. Breitenbush Hot Springs, on the North Fork of the Breitenbush River, includes a group of about 40 springs that collectively discharge about 900 gal of water per minute at a temperature of 92° C (Bowen and Peterson, 1970). Austin Hot Springs are located on the Clackamas River, about 16 mi (≈26 km) to the northwest of the Olallie Roadless Area. They discharge hot water (≈91° C) at a rate of about 250-300 gal per minute. Thermal springs also are present on the Warm Springs Indian Reservation about 28 mi (≈45 km) to the east (Robison and Laenen, 1976). The entire region along this part of the Cascade Range in Oregon is characterized by heat flow that is 2 to 3 times normal (Riccio, 1978). The commercial or exploration significance, if any, of this higher-than-normal heat flow has yet to be determined.

CONCLUSIONS

No metallic-mineral deposits of commercial value were recognized in the Olallie Roadless Area during the present investigation. Evaluation of the geology and analyses of samples indicates that such deposits are not likely to be found, except possibly at considerable depths beneath the surface where they likely would be uneconomic. Cinders (scoria) suitable for some construction purposes is present, but more accessible and better quality material is present in nearby areas. Evaluation of the geology indicates that the area is not likely to contain mineral fuels. Hot springs and above-normal heat flow in the region indicate that there may be some as yet undefined potential for the development of geothermal energy. Absence of thermal springs or evidence of extensive underground flow of water within Olallie Roadless Area suggest, however, that the potential for geothermal energy is probably small.

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