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PAMPHLET

MINERAL RESOURCE POTENTIAL AND GEOLOGY OF THE WET BEAVER ROADLESS AREA, COCONINO AND YAVAPAI COUNTIES, ARIZONA

By

George E. Ulrich, U.S. Geological Survey,
Alan M. Bielski, U.S. Bureau of Mines,
and
J. Suzanne Bywaters, U.S. Geological Survey

STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and related acts, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral survey of the Wet Beaver Roadless Area (U.S. Forest Service number 03045), Coconino National Forest, Coconino and Yavapai Counties, Ariz. The Wet Beaver 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.

MINERAL RESOURCE POTENTIAL SUMMARY STATEMENT

The mineral resource potential of the Wet Beaver Roadless Area, Ariz., is low, based on field studies performed by the U.S. Bureau of Mines and the U.S. Geological Survey during 1980-82. No concentrations of minerals are indicated by geologic mapping, geochemical sampling, or geophysical investigations within the boundary of the roadless area. Basaltic cinders and sandstone have been quarried for construction materials near the area but are readily available and more accessible outside the precipitous canyon of Wet Beaver Creek.

INTRODUCTION

Location, size, and geographic setting

The Wet Beaver Roadless Area includes 9,890 acres (15.4 mi^2) of the Coconino National Forest in T. 15 N., R. 6, 7, and 8 E., Yavapai and Coconino Counties, central Arizona (fig. 1). Camp Verde, the nearest major town, is about 13 mi southwest of the roadless area.

The roadless area boundary closely follows the rim of the steep-walled canyon cut by Wet Beaver Creek into the gently westward-sloping surface of the Colorado Plateau. The mouth of the canyon and the west boundary of the area are near the Mogollon Rim, an escarpment that marks the southwestern margin of the Colorado Plateau physiographic province. Here, the plateau surface falls off sharply to the Verde Valley, and Wet Beaver Creek flows 12 mi farther where it joins the Verde River, the master stream of the region.

The highest point within the roadless area is 6,470 ft just east of Hog Hill. The lowest point, at 4,000 ft, is the streambed of Wet Beaver Creek near the west boundary. Topographic relief within the roadless area ranges from 1,200 ft, near the mouth of the canyon at Casner Butte, to about 150 ft at the east boundary.

Perennial springs below Hog Hill discharge about 1,200-1,500 gal of water per minute into Wet Beaver Creek (Twenter and Metzger, 1963, p. 94).

The west boundary of the roadless area and the mouth of Wet Beaver Creek canyon are accessible by U.S. Forest Service roads from either Camp Verde or the Sedona interchange on Interstate Highway 17. Various points along the canyon rim and the roadless area boundary can be reached by unimproved roads, jeep trails, and pack trails. The canyon floor is accessible only on foot; in several places, deep pools require a swim or steep climb and descent for traverse of the canyon.

Geologic setting

The Wet Beaver Roadless Area is on the southwestern margin of the Colorado Plateau. The

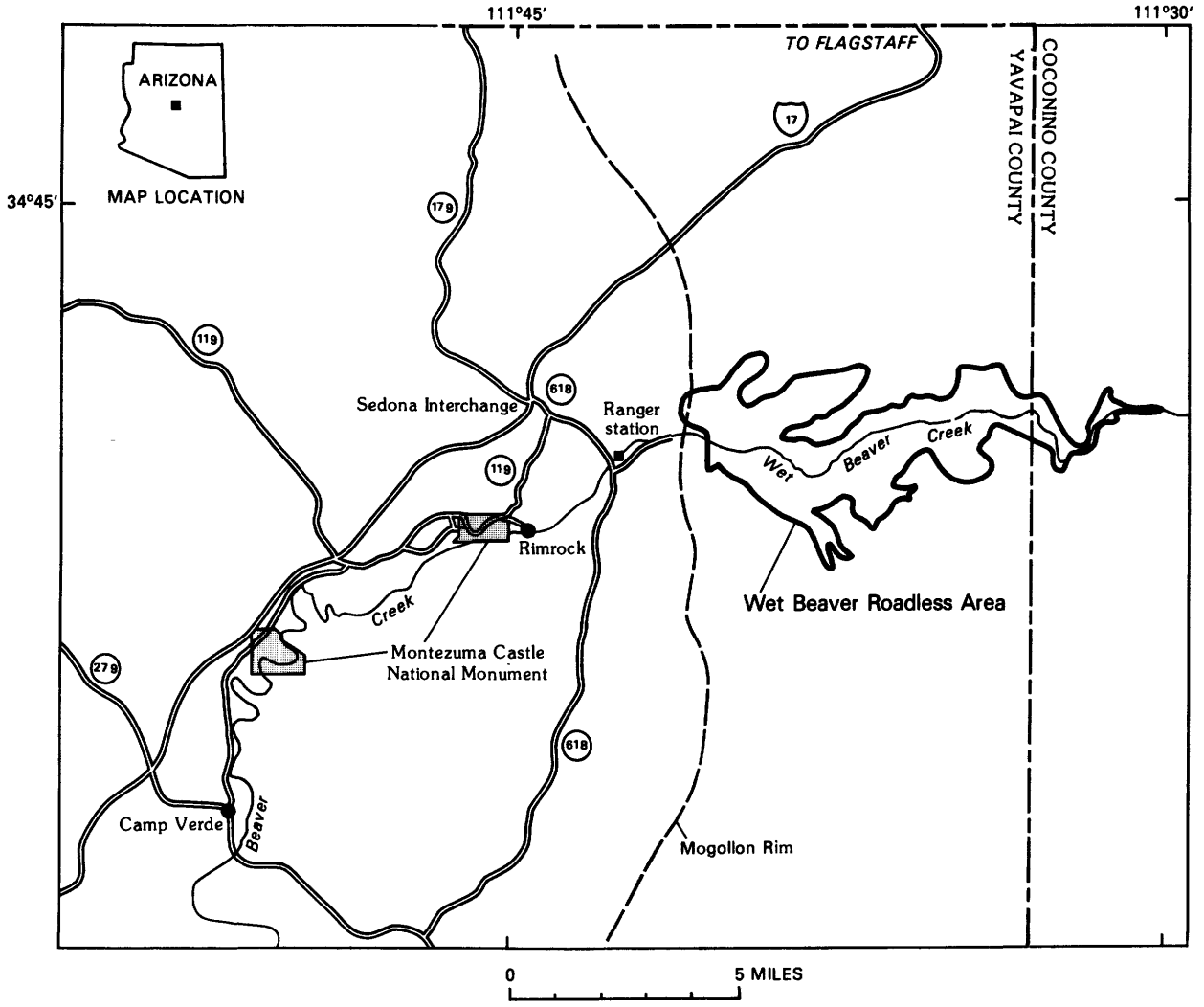

Figure 1.--Index map showing location of the Wet Beaver Roadless Area (U.S. Forest Service number 03045), Coconino and Yavapai Counties, Ariz.

creek and its tributaries have cut precipitous canyons through upper Tertiary basaltic rocks that unconformably overlie Lower Permian sedimentary rocks (fig. 2). The unconformity truncates increasingly older rocks from east to west and is locally marked by a thin gravel deposit. Basaltic tuffs commonly underlie the thick sequence of basaltic flows, and an intrusive basaltic plug is exposed near the confluence of Long Canyon and Wet Beaver Creek. Basaltic dikes are common in dissected vent areas.

The structural setting is one of variable local dips and a gentle regional dip to the east within the sedimentary rocks. Normal faults offset volcanic and sedimentary units, dip steeply, and strike mainly northwest or north. Blocks of Permian strata between faults are generally upthrown on the west and tilted downward toward the east. The net displacement for all faults mapped within the main canyon is about 1,300 ft down to the west. The density of faults increases locally near areas of basaltic vent deposits. The base of the volcanic rocks resting on the Kaibab Formation rises 900 ft from the easternmost exposure in the roadless area to an escarpment 4 mi farther east. The area between is covered completely by basalt flows that obscure the underlying structure.

Mining activity

There is no evidence of mining activity in the immediate vicinity of the roadless area. No mining claims, mineral leases, mines, prospects, quarries, or borrow pits were found within the roadless area during the course of the field investigations.

GEOLOGY

The general geology and hydrology of the Verde Valley, including the canyon of Wet Beaver Creek, was described and mapped in reconnaissance by Twenter and Metzger (1963). An unpublished thesis and geologic map of the canyon by Thompson (1968) provided valuable reference data for this study.

The rocks of the Wet Beaver Roadless Area include about 1,450 ft of upper Paleozoic strata, which are unconformably overlain by Tertiary basalt flows and pyroclastic deposits that range from 300 to 1,500 ft thick. At the unconformity, a few feet of residual gravel and conglomerate that contain chert, limestone, and sandstone occur in several areas. Locally, the gravel and conglomerate form channel-fill deposits as much as 120 ft thick and contain clasts of Precambrian and lower Paleozoic rocks. In one area, about 1 mi southwest of Hog Hill, 120 ft of conglomeratic, white sandstone and limestone occurs at the unconformity. This deposit is interpreted as a local fluviolacustrine unit contemporaneous with the gravel.

The Paleozoic (Lower Permian) rocks comprise, in ascending order, the upper part of the Supai Formation (550 ft), including the Fort Apache Limestone Member, a 5- to 15-ft-thick bed about 350 ft below the top; the Toroweap Formation and Coconino Sandstone, undivided (600 ft); and the Kaibab Formation (280 ft). Prevolcanic erosion removed more than 1,200 ft of these strata and formed the westward-dipping unconformity on which gravels, conglomerates, and basaltic rocks were deposited. A potassium-argon age of 14.6±0.4 m.y. for a basalt flow that overlies the gravel near the canyon mouth, reported by Peirce and others (1979), places an upper limit for the age of this erosion at mid-Miocene time.

Faults, shear zones, and joints trend north and northwest, parallel to the margin of the Colorado Plateau in and near the roadless area. The net displacement of these faults across the area is about 1,300 ft down to the west. The number of faults increases in some areas of basaltic vent deposits; the area southeast of Hog Hill is an example.

The regional dip of sedimentary strata between fault zones is generally to the east; however, the direction of local dips is variable. Toward the upper, east end of the canyon, the elevation of the basalt-Kaibab unconformity rises 900 ft from the easternmost exposure on Wet Beaver Creek to the upper part of Brady Canyon, 1.3 mi beyond the east margin of the area shown on the map. The 4-mi-wide area between these outcrops is covered by volcanic flows that conceal the structure of the underlying sedimentary rocks. The hidden structure is interpreted as a combination of normal faulting, down to the west, and a 1°–2° dip of the sedimentary strata on the southwest flank of the Mormon Lake anticline of Twenter and Metzger (1963).

GEOCHEMISTRY

Preliminary appraisal of the geochemical data for 64 stream-sediment samples, 30 heavy-mineral concentrates, 7 rock samples, and 7 water samples from the Wet Beaver Roadless Area does not indicate anomalous concentration of metals (Gerstel, in press; Gerstel and others, 1983).

GEOPHYSICS

An aeromagnetic survey was conducted to determine any anomalies that might be associated with buried mineral deposits in the roadless area (Martin, in press). The low-altitude aeromagnetic data obtained show short-wavelength anomalies; long-wavelength anomalies may be masked by the short-wavelength data. Broad magnetic lows occur over sedimentary rocks where overlying volcanic rocks are thin or absent. Steep-gradient magnetic highs, some with associated lows, occur over large basaltic bodies. A regional, northwest-trending magnetic high, more than 150 mi long, crosses the roadless area approximately in its center as shown on the "Residual Aeromagnetic Map of Arizona" (Sauck and Sumner, 1970). Current interpretation of the geophysical data does not indicate the presence of significant mineral occurrences.

MINING DISTRICTS AND MINERALIZED AREAS

The Wet Beaver Roadless Area is not part of an organized mining district. Records at the Yavapai and Coconino County Courthouses and the U.S. Bureau of Land Management State Office do not contain mining claims or mineral leases for lands in or near the roadless area. A literature review and field investigaton conducted in 1980 did not reveal any mines, prospects, or mineralized areas in the immediate vicinity of the roadless area.

Basalt, basaltic cinders, and sandstone have been quarried for construction purposes, on a small scale, at various places several miles from the roadless area.

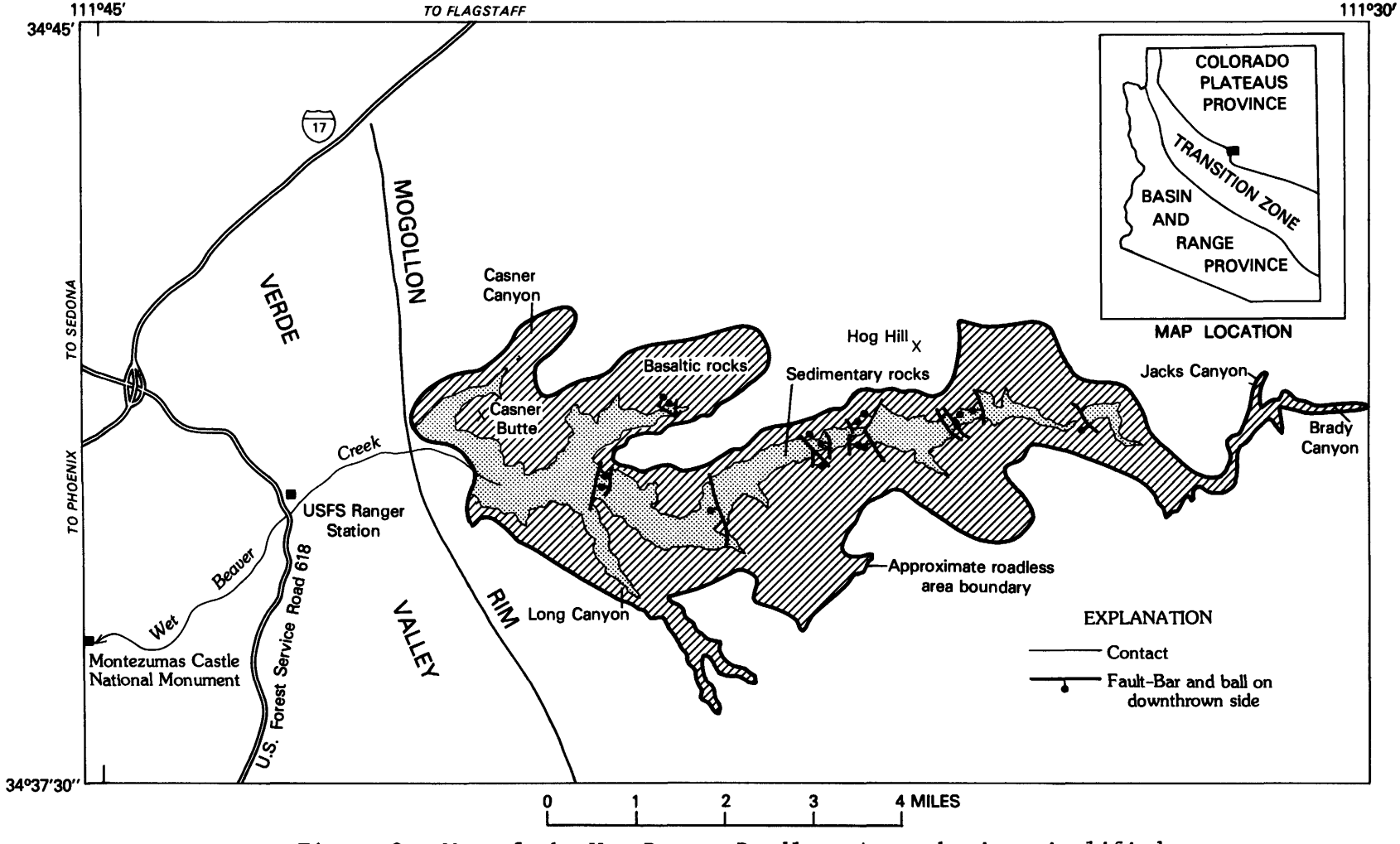

Figure 2.--Map of the Wet Beaver Roadless Area showing simplified geology within area boundary and other features noted in the text. Mineral resource potential is low for the entire area.

Basalt and basaltic cinders may be used for road metal, concrete aggregate, riprap, and cinder blocks; the Coconino Sandstone has been used as building stone; and the coarser, clastic material of the Supai Formation has been used as fill. Although these rock materials occur within the roadless area, similar materials are more readily available at nearby localities.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The mineral resource potential of the Wet Beaver Roadless Area is low. The results of geologic, geochemical, and geophysical investigations and an assessment of mining activity do not indicate the presence of mineral resources in the area (fig. 2). Although rock materials that may be used for construction purposes occur here, an abundant supply of similar construction materials is more readily available at other places.

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