

TECTONIC-METALLOGENIC MAP OF WHITE SULPHUR SPRINGS 1 X 2 QUADRANGLE, MONTANA

by
Lee A. Woodward
Department of Geology
University of New Mexico
Albuquerque, New Mexico 87131

This 1:250,000-scale map covers 28 mining districts and shows over 300 individual mineral occurrences. The map depicts relationships between structures, rock units, and mineral deposits so that inferences can be made about controls of mineralization and exploration targets can be defined.

Principal tectonic elements include faults (particularly major basement faults with recurrent movement), fracture or shear zones, tectonic breccias, and folds. One of the major tectonic elements is the eastern end of the Lewis and Clark line, a west-northwest-trending system of Cretaceous to Tertiary thrusts and steep strike-slip and dip-slip faults that are partly superimposed on Middle Proterozoic growth faults. Lode gold occurrences along the Lewis and Clark line are interpreted to be remobilized from syngenetic Middle Proterozoic deposits near basement growth faults active during deposition of the Newland and Greyson formations of the Belt Supergroup. Gold was probably remobilized during widespread but volumetrically minor magmatism in the Late Proterozoic and again in the Cretaceous-Tertiary. At least 1,000,000 ounces of gold have been produced from deposits along this part of the Lewis and Clark line.

Rock units shown on the map emphasize favorable hosts for precious-metal mineralization. Stratigraphic units that are especially favorable include the Newland Limestone and Greyson Shale (both Proterozoic). The Newland hosts recently discovered copper-cobalt-gold sedimentary exhalative deposits near White Sulphur Springs and the Greyson contains low-grade syngenetic or diagenetic gold in mudstones and siltstones with very large tonnages in the York district. Mississippian carbonates are also shown separately because they commonly host precious-metal replacement deposits. Another major tectonic element is the Boulder batholith which mainly hosts vein deposits. Disseminated deposits occur in volcanic rocks which are also shown separately.

Mineral occurrences show metals (listed in decreasing order of value) and the type of deposit (e.g., vein, stockwork, contact replacement, disseminated, breccia-hosted, syngenetic, etc., insofar as known).

For initial work, 1 X 2 (1:250,000-scale) maps are convenient because they cover large areas at low cost. After exploration targets are defined, larger scale maps (1:62,500 or 1:100,000) allow for refinement and more detail. The tectonic-metallogenic map provides a great deal of data in a convenient manner so that it essentially serves as an 'idea map' for generating exploration targets.