STRUCTURAL EVOLUTION OF LOW ANGLE NORMAL FAULTS AND METAMORPHISM AT BARE MOUNTAIN, SW NEVADA

Nº 26285

Monsen, Susan A., and Day, Howard W., Dept. of Geology, University of California, Davis, CA 95616

Northwest Bare Mountain contains regionally metamorphosed PC-Paleozoic strata that have been folded and subsequently cut by numerous moderate and low angle faults. The metamorphism and style of deformation appear atypical of metamorphic complexes exposed in the Great Basin. Development of metamorphic fabric is the earliest recognizable structural event. Bedding plane parallel metamorphic foliation is folded about axes that plunge gently northeast. The folded strata are truncated by two generations of normal faults: 1) north trending, east dipping faults with apparent right lateral offset, and 2) low angle normal faults that form a complex, subparallel network. The latter faults everywhere emplace younger rocks over older, and are responsible for significant attenuation of the section. At one locality these faults cut out the entire Middle and Upper Wood Canyon Formation the Zabriskie Quartzite, and the Middle Carrara Formation, a total thickness of about 1100 meters. The highest grade metamorphism coincides with the area of the most complex faulting, yet there is no major discontinuity in metamorphic grade across the faults.

Metamorphic grade varies from greenschist in the south to lower amphibolite facies in the north. The development of diagnostic assemblages and metamorphic fabric is inhibited by the quartz rich lithologies. Pelitic rocks are found only in the Carrara Formation where the assemblage, quartz+muscovite+plagioclase+biotite+garnet+staurolite occurs, suggesting burial of at least 8-10 km.

The timing of faulting and metamorphism is poorly constrained. Tertiary dikes are cut by north trending faults which are in turn cut by low angle normal faults. This suggests Tertiary displacement on both sets of faults. Metamorphism clearly occurred prior to faulting but no further constraints are available.

CHRONOLOGY OF EARLY MESOZOIC PLUTONISM AND VOLCANISM IN THE YERINGTON DISTRICT, WESTERN NEVADA

Nº 19361

DILLES, J. H., Dept. of Geology, Stanford U., CA 94305; WRIGHT, J. E., Dept. of Geology, U. C. Berkeley, CA 94720; and PROFFETT, J. M., Jr., P. O. Box 10-1253, Anchorage, AK 99511

U-Pb geochronology defines two major plutonic and volcanic suites in the Yerington District of western Nevada. The older suite is located in the N. Wassuk Range and consists of up to 2000 ft of andesite to quartz latite flow, breccia, and tuff interbedded with minor siliceous argillite, chert, and limestone. The section is intruded by a pyroxene diorite with a concordant U-Pb zircon age of 230 m.y.b.p. In the Singatse Range the McConnell Canyon volcanics (MCV) consist of 4300+ ft of andesite-felsite and are possibly correlative to this suite. We provisionally interpret this suite as an Upper Triassic to Permian submarine volcanic arc.

6000 ft of Upper Triassic to Middle Jurassic sediments disconformably overlie the MCV. The sediments consist of marine tuffaceous silts and limestones overlain by a gypsum evaporite and an eolian quartz sandstone.

The second magmatic suite began with the eruption of 6000 ft of the subaerial Artesia andesitic volcanics (AV) that conformably overlie sandstone. The AV appear to be comagmatic with the shallow-level Yerington batholith (YB), which intrudes them. The YB consists of four major intrusive units all emplaced within a period of no more than one million years: concordant U-Pb zircon dates place early granodiorite at 169 m.y.b.p. and late quartz monzonite porphyry (QMP) at 168 m.y.b.p. QMP dikes are genetically related to major porphyry copper and skarn mineralization in the District. The next magmatic event occurred in the Pine Nut and Buckskin Ranges. Here, latite and quartz latite domes, breccias, and tuffs of Fulstone Spring disconformably overlie AV and are intruded by the Shamrock quartz monzonite batholith (SB). The SB is the youngest intrusive of the second suite with a concordant U-Pb zircon age of 165 m.y.b.p. Thus, the second suite represents a major pulse of Middle Jurassic arc plutonism and volcanism ranging from pre-169 to 165 m.y.b.p.

EVIDENCE FOR MID-TERTIARY DETACHMENT FAULTING IN THE NEWBERRY MOUNTAINS, SOUTHERN NEVADA

Nº 19842

MATHIS, R. S.*, and FROST, E. G., Dept. of Geological Sciences, San Diego State Univ., San Diego, CA 92182
*Present Address: Dept. of Geology, Louisiana State Univ., Baton Rouge, LA 70803

Field studies in the Newberry Mtns. have defined an Oligocene (?) to Middle Miocene low-angle (dip = 10^{o}-30^{o}) normal fault which crops out around the perimeter of the range. This fault was first recognized by Volborth (1973) who interpreted it as a Tertiary thrust. Our work suggests that it is part of a regional low-angle normal fault (detachment) related to continental extension. Upper-plate rocks consist of PЄ rapakivi granite depositionally overlain by Tertiary volcanic rocks. These volcanic rocks are considered equivalent to the Alcyone Volcanics in the Black Mtns., AZ, an Oligocene to Miocene caldera complex. The lower-plate complex exposed in the core of the range consists largely of Mesozoic intrusive rocks and PЄ plutonic and metasedimentary rocks. A resistant cataclasite layer exists along the detachment surface exhibiting flow banding with small scale normal faults. Rocks directly below the fault have been sheared, forming a thick (locally >100 m) chlorite breccia zone. This breccia has yielded a K-Ar biotite age of 12.2±.2 my that presumably reflects the age of the hydrothermal chloritization. This date also establishes the younger limit of the timing of detachment faulting. The range also contains two Tertiary fold sets. The first set trends north and is cut by the detachment. This fault surface was warped into a set of northeast-trending folds by a later event. Kinematic indicators (slickenside striae, shears, and hematite streaks) suggest that extension of the upper plate occurred along a NE-SW axis. This is parallel to the direction of extension inferred from shears within the cholrite breccia zone, suggesting that distension and rotation of the upper plate was linked with the development of the detachment and associated chlorite breccia.

PROPOSED CALDERA STRUCTURES IN CENTRAL NEVADA INFERRED FROM GRAVITY LOWS

Nº 24851

SNYDER, D. B., U.S. Geological Survey, 345 Middlefield Road, Menlo Park, CA 94025

Gravity observations were made in the Toquima and Toiyabe Ranges of central Nevada as part of a mineral assessment program because gravity measurements have successfully defined calderas in southern Nevada by discriminating thick sections of Tertiary volcanic rock from older rocks. Mineral deposits commonly are spatially related to Tertiary volcanic centers, and reconnaissance geologic mapping has identified these two ranges as the sources of local voluminous silicic tuff.

Models assuming simple density distributions show that in the Toquima Range the previously recognized Manhattan and multilobed Mount Jefferson calderas contain at least 2,000 and 4,000 m of tuff, respectively. Gravity lows define three proposed volcanic centers in the Toiyabe Range that may contain calderas. These structures are adjacent, are associated with a northwest-trending lineament, and are obscured by a continuous surface cover of tuff. Models of these features show that the recently recognized south Peavine caldera contains at least 2,500 m of fill, presumably tuff, and the other two volcanic centers at north Peavine and Arc Dome at least 3,000 m of fill.

The unusually low local gravity values in parts of Big Smoky and Monitor Valleys indicate great thicknesses of low-density subsurface material. This material may be either valley alluvium filling unusually deep local basins, or tuff filling calderas or vents concealed beneath the valley alluvium. The second choice is strongly supported by the thick tuff sections observed at Arc Dome and Mount Jefferson immediately adjacent to the two gravity lows in the valleys; together, these four features appear to form an irregular east-west-trending band of calderas, vents, and tuff-filled depressions. If the margins of the two gravity lows represent caldera walls, these margins may be good mineral exploration targets.

REGIONAL THRUST DECOLLEMENT AND VOLCANISM IN THE PANCAKE RANGE, NYE COUNTY, NEVADA, AND IMPLICATIONS FOR MINERALIZATION

Nº 23801

CONNOLLY, James R., Department of Geology and Institute of Meteoritics, University of New Mexico, Albuquerque, NM 87131

Outcrops of Mississippian Chainman Shale in the central and southern Pancake Range in northern Nye County are mostly located in the lower plate of thrust faults. The Middle to Upper Paleozoic strata involved in the thrusts are predominantly carbonates, and Chainman Shale is the only argillaceous formation of significant thickness (100 to 600 m) within the sequence. Allochthonous upper plate strata at various locations include the Nevada Formation, Devil's Gate Limestone and Pilot Shale (Devonian) and Joana Limestone (Lower Mississippian).

Chainman Shale typically crops out in topographically subdued park-like areas which are marginally overlain by mid-Tertiary ignimbrites. Klippen of older carbonates are present locally in most outcrop areas, and the highest peak in the range (Portuguese Mountain, elev. 2818 m) is underlain by allochthonous upper plate carbonates. In most Chainman Shale outcrop areas, upper plate rocks were extensively eroded prior to volcanism. Uplifts along high-angle, post-volcanic basin-range faults have modified the thrust geometry. A typical shale outcrop area is bounded on one side by a high angle normal fault and overlain on the other three sides by volcanics.

Field evidence suggests the shale is largely impermeable and may have been an important trap for metals leached from the overlying volcanics; local silicification of upper plate carbonates suggests thrusts may be mineralized locally. The regional consistency of fault relations and abundance of volcanics suggest potential mineralized zones may be present at depth, particularly where these potential traps were favorably located relative to volcanic hydrothermal systems.