GL03470

equivalent to the combined San Juan and Uncompahgre calderas which formed during Sapinero Mesa eruptions. Rock units previously assigned to the Silverton Volcanic Group (Eureka Tuff, Picayune, Burns, and Henson Formations) and the Potosi Volcanic Group (Gilpin Peak Tuff) are correlative with other named units nearby in the volcanic field.

LATE CENOZOIC BASALTIC VOLCANISM AND DEVELOPMENT OF THE RIO GRANDE DEPRESSION IN THE SOUTHERN ROCKY MOUNTAINS

Lipman, Peter W., and Mehnert, Harald H., U.S. Geological Survey, Denver, Colorado 80225

In the southern Rocky Mountains upper Cenozoic basalts were erupted widely in areas characterized in middle Tertiary time by predominantly intermediate-composition volcanism. Initiation of basaltic volcanism coincided approximately with beginning of extensional block faulting that resulted in development of the Rio Grande depression, a major rift structure that separates the stable platforms of the High Plains and the Colorado Plateau. Time relations are especially clear along the San Luis Valley segment of the Rio Grande depression in southern Colorado and northern New Mexico, where 15 basalt flows have been dated by K-Ar methods. Along the west margin of the San Luis Valley, silicic alkalic basalts as old as 26 m.y. rest unconformably on a pediment cut on middle Tertiary andesitic and related rocks (35-27 m.y. old), and similar basalts 20-0.24 m.y. old interfinger with and overlie volcaniclastic alluvial-fan deposits (equivalent to Santa Fe Group) that accumulated in the subsiding depression.

Basalts erupted during late Cenozoic block faulting vary in composition with distance from the axis of the northern Rio Grande depression. Tholeiitic rocks are largely confined to the Rio Grande depression, and the basalts become more alkalic to the west and east. Relatively silicic alkalic basalts, including both undersaturated and saturated types, occur throughout the region, but very undersaturated alkalic basalts were erupted only on the Colorado Plateau and the High Plains. The lateral change from tholeiitic to alkalic basaltic volcanism probably reflects different conditions of magma generation in the mantle that are related to changes in crustal thickness and thermal gradients across the depression.

166

REFINEMENT OF THE BIOTITE-APATITE GEOTHERMOMETER

Ludington, Stephen D., Department of Geological Sciences, University of Colorado, Boulder, Colorado 80302

Chemical analyses of coexisting biotite-apatite pairs, coupled with independent measures of their temperatures of formation, place restraints on the free energy of the exchange reaction:

F-biotite + OH-apatite = OH-biotite + F-apatite.

Previously published distribution coefficients for fluoride-hydroxyl exchange in synthetic biotite allow calculation of free energy of the biotite exchange reaction:

OH-biotite + HF = F-biotite + H_2O

Values obtained for ΔG°_{298} for the above reaction are: phlogopite, -15.5Kcal/mole; annite, -13.9Kcal/mole; and siderophyllite, -11.3Kcal/mole. The phlogopite value allows a "best" estimate of the free energy difference between fluor- and hydroxy-apatite which is consistent with previously reported calorimetric data on apatite. The other free energies allow the phlogopite-apatite geothermometer of

UNIVERSITY OF UTAH
RESEARCH INSTITUTE
EARTH SCIENCE LAB.

Stormer and Carmichael (1971) to be extrapolated to most biotite compositions.

The results, when applied to suites of biotite-apatite pairs, yield improved agreement with independent temperature estimates, compared with temperatures uncorrected for iron content of biotite.

REGIONAL GRAVITY AND AEROMAGNETIC STUDIES IN SOUTHERN IDAHO

Mabey, Don R., Peterson, Donald L., and Wilson, Carol W., U. S. Geological Survey, Denver, Colorado 80225

The Snake River Plain is an area of relatively high Bouguer gravity anomaly values and high magnetic intensity. The gravity anomaly is more prominent in the western part of the Plain and the magnetic anomaly is more prominent in the southern and eastern parts. The major gravity variation correlates with the low regional elevation of the Plain relative to adjoining areas; thus, isostatic compensation for the Plain is indicated. If local compensation is assumed and the gravity effect of the regional topography is removed, the resulting residual anomalies over the Plain probably primarily reflect variations in the thickness and density of the volcanic and sedimentary rocks of Cenozoic age, which are as much as 6 km thick. The major magnetic anomalies over the Plain are related to the Cenozoic volcanic rocks, and no magnetic expression of a basement is recognized. The gravity and magnetic data suggest that the pre-Cenozoic rocks underlying the Plain are similar to rocks outcropping north and south of the Plain.

Local gravity lows of as much as 45 milligals are produced by thick prisms of Cenozoic fill in the intermontane basins in the eastern part of the State. The larger lows do not extend to the edge of the Plain and no evidence of Basin and Range structure extending across the Plain is recognized. The area of lowest Bouguer gravity values is the region of high topography north of the Plain. The Idaho batholith does not have pronounced gravity or magnetic expression; however, the Tertiary batholiths produce magnetic highs and gravity lows.

TECTONIC FABRIC OF THE GOLCONDA ALLOCHTHON, WEST-CENTRAL NEVADA

MacMillan, J. R., New Mexico Institute of Mining and Technology, Socorro, New Mexico 87801

Rocks previously assigned to the upper plate of the Golconda Thrust occur within a 3000 sq. mi. area of west-central Nevada. Detailed structural studies in the Fish Creek Mountains, Battle Mountain, and the Tobin and New Pass Ranges indicate that these rocks are tectonites.

The tectonic fabric of the Golconda allochthon is consistent within this area and records multiple stages of deformation. Early folds are typically isoclinal with large amplitude to wavelength ratios. The early isoclines are refolded about axes colinear with the axes of the isoclines. Refolded isoclines are absent from the lower plate of the Golconda Thrust, indicating that such folding occurred prior to thrusting. Later folds, synchronous with thrusting, are characterized by axial planes oriented normal to the axes of earlier folds.

Rocks in the Golconda allochthon tend to be unfossiliferous

UNIVERSITY OF UTAH RESEARCH INSTITUTE