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PETROLOGY OF MID-TERTIARY(?) VOLCANIC FLOWS IN THE NORTHERN RIO GRANDE RIFT, SALIDA, COLORADO

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A sequence of mafic-to-intermediate composition volcanic flows crops out in a paleochannel along the Arkansas River at Salida in central Colorado. The flows unconformably overlie the Wall Mountain Tuff (36.69 Ma) and Precambrian basement and may have developed either as late stage intermediate volcanism associated with the San Juan or Thirty-Nine-Mile volcanics or more likely, with early development of the northern Rio Grande Rift. Thirty-six samples were obtained from the Tenderfoot Hill region and several canyons to the south for analysis. Four major units were identified: 1) Clinopyroxene-bearing alkaline olivine basalt (AOB) is a 1,000 meter thick unit interbedded with thin layers of ash. The unit includes plagioclase (4.5mm), pyroxene and olivine phenocrysts in an olivine, clinopyroxene, plagioclase-rich groundmass. 2) Hypersthene-bearing trachyandesite (HBTA) found in the northern section of the study area, has phenocrysts of flow-oriented plagioclase with clinopyroxene and orthopyroxene. 3) Hornblende-bearing trachyandesite (HTA) occurs in a small outcrop on the west side of Tenderfoot Hill and contains oxyhornblende, orthopyroxene and clinopyroxene. 4) Pyroxene-bearing trachyandesite (PBTA) occurs as thick flows and laharic breccias. Rocks types are diverse, but contain plagioclase, orthopyroxene and clinopyroxene. Silica contents of the four units range from 51.9% (AOB) to 59.1% (PBTA). Based on geochemical graphs, AOB is a basaltic trachyandesite and the other units are trachyandesites. Except for AOB, they are tholeiitic. They are all very high in K₂O (shoshonitic field) and Zr. Mg#s are highly evolved (~12-23). Ti and to a lesser degree Fe and Mg serve as excellent discriminators among the four flows. These flows all show similar REE patterns, ~300x enriched in LREE's with a slight negative Eu anomaly. Incompatible element plots show strong enrichment in K, Rb, Ba relative to MORB and a pronounced Nb-Ta trough. They are a good match for OIB or UCC. Tectonic discriminant diagrams are ambiguous; they plot as both rift and arc basalts. The geochemical data suggest the flows are early Rio Grande Rift volcanics that show crustal contamination (high K, Zr) but are derived from a mantle source. The Ta/Nb trough suggests that the source may be related to subduction-zone-modified lithosphere from the development of the Thirty-Nine Mile or San Juan Volcanic fields.

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