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Laccolithic Complexes of Southeastern Utah: Time of Emplacement and Tectonic Setting—Recommendations for Additional Studies

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1. An electronic database of major- and trace-element, isotopic, geochronologic, and petrographic analyses should be compiled for the igneous rocks on and adjacent to the Colorado Plateau. Such a database would be a powerful tool to characterize and compare igneous suites (Nealey and Sheridan, 1989, among others); evaluate metallic mineral exploration potential (for example, Mutschler and others, 1985); and develop and test models relating igneous rock chemistry to magma genesis and tectonic setting (for example, Fitton and others, 1991). To maximize the potential for interfacing the igneous rock information with geophysical and other data bases through GIS systems, accurate latitude and longitude or UTM coordinates for each sample location should be incorporated in the database.

2. Additional geochronological studies should be directed to date both oldest and youngest plutons in the laccolithic complexes on and adjacent to the Colorado Plateau. The following should be dated: The syenite pluton at Navajo Mountain, Utah (Condie, 1964); the Klondike Hills, Colo., plutons (Shawe and others, 1968); the syenodiorite and monzonite plutons of the Levan, Utah area (Witkind and Weiss, 1991 and references therein). Likewise, the following have not been dated: in the Henry Mountains, Utah, the youngest plutons (granite porphyry of Hunt, 1988); in the La Sal Mountains, Utah, the young granite porphyry and soda rhyolite porphyry (Hunt and Waters, 1958). The only dates available for the Carrizo Mountains, Ariz., are two K-Ar dates of ≈70 Ma (Armstrong, 1969), which may reflect excess argon. The Carrizo Mountains may well be Laramide, but further dating is in order.

3. Further characterization of the physical, chemical, and age attributes of the crystalline basement rocks underlying the Colorado Plateau is in order. Cuttings and core from petroleum test wells that reached basement are largely undescribed in terms of detailed lithology, age, density, and magnetic properties. These studies would allow us to refine and better constrain geophysical and geological models.

4. Evaluation of the possibility of unconventional metal deposits on the Colorado Plateau should be given a high priority. Possible deposit models include Ni-Mo-PGE-Au ores in black shales (Coveney and Nansheng, 1991) in the Paradox basin; PGE-Au mineralization associated with roll-front uranium deposits; and PGE-Au mineralization associated with subtle alteration zones and (or) "redbed" Cu-Ag mineralization in Lisbon Valley and Bull Canyon, Utah.

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