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K-Ar Ages of Plutonic Rocks, Volcanic Rocks and Hydrothermal Gold and Silver Deposits in Central and Western Nevada

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Recently compiled summaries of isotopic ages of plutons and volcanic rocks in western and central Nevada now permit the construction of an absolute, albeit tentative, timetable for igneous activity in the region. Recently completed isotopic ages on 17 gold and silver deposits allow more precise comparisons to be made about times of ore deposition than heretofore possible.

Granitic rocks were emplaced during three pulses: Jurassic (175-140 m.y.), Cretaceous (125-65 m.y.), and Tertiary (40-30 m.y.).

Tertiary igneous activity in central Nevada generally began with abrupt localized eruptions of andesite and dacite lavas and intrusion of small granodiorite and quartz monzonite stocks about 40 m.y. ago. Beginning about 34 m.y. ago, eruptions of voluminous and extensive rhyolite to quartz latite ash-flow sheets superseded dominantly andesitic volcanism and continued until 20 m.y. ago. After a hiatus in igneous activity, volcanism resumed in central Nevada with eruption of rhyolite, basalt, and basaltic andesite flows between 16 and 10 m.y. ago.

The earliest Tertiary volcanic rocks in western Nevada are widespread ash-flow sheets of rhyolite and quartz latite composition that were erupted between 28 and 21 m.y. ago. Later Tertiary igneous

activity in western Nevada is represented by a broad spectrum of types and compositions of volcanic rocks. The most voluminous of these are andesite and dacite flows, which were erupted from many scattered volcanic centers in the region between 21 and 8 m.y. ago. The andesites and dacites are overlain by and interfingered with sedimentary rocks containing significant amounts of silicic tuff that accumulated in restricted basins between about 15 m.y. ago and the present. In some areas, flows of alkaline olivine basalt and trachyandesite were erupted during this 15-m.y. interval, and these basalts are interbedded with the sedimentary rocks in many places. Between about 5 m.y. ago and the present, alkaline andesites and dacites were erupted from scattered vents in the region. Although considerable overlap in age exists between the andesites, sedimentary rocks, and basalts in the region, in any one area andesite tends to precede sedimentary rocks and basalts.

The following gold- and silver-bearing quartz vein deposits in pre-Tertiary host rocks have been dated: Imlay--73 m.y. (adularia), Ten Mile--16 m.y. (adularia), Manhattan--16 m.y. (adularia). The following vein deposits in Tertiary volcanic rocks have been dated: Tuscarora--38 m.y. (adularia), Midas--15 m.y. (adularia), Buckhorn--15 m.y. (adularia), Round Mountain--25 m.y. (adularia), Tonopah--19 m.y. (adularia), Goldfield--21 m.y. (alunite), Aurora--10 m.y. (adularia), Comstock--13 m.y. (adularia), Bodie (California)--8 m.y. (adularia). Monitor (California)--5 m.y. (sericite). The disseminated gold deposits at Getchel and Gold Acres have been dated at 68 m.y.

(biotite-sericite) and 94 m.y. (sericite), respectively. The replacement gold deposits at Copper Canyon (Battle Mountain) and Eureka have been dated at 38 m.y. (biotite) and 102 m.y. (sericite), respectively. The results so far obtained show that gold mineralization in central and western Nevada is associated with both Tertiary and pre-Tertiary igneous activity and confirms deductions made by others prior to the advent of K-Ar techniques. Much of the vein mineralization in central Nevada, even in pre-Tertiary rocks, appears to have taken place during the 16 to 10 m.y. basalt-rhyolite volcanism. In western Nevada, mineralization occurs over a broad range in time from 25 to 5 m.y. ago. However, the largest known ore deposits are restricted to andesitic host rocks, and their ages are close to the age of andesitic volcanism. Ore deposition is clearly related in time to some local phase of igneous activity in those areas where detailed studies of geochronology have been made.