

that the Los Pinos gabbro is an erosional cross section through a late Jurassic volcano. The inner olivine gabbro may then represent the magma chamber and its differentiation products whereas the comb structures may have been fluid-rich channels that marked the boundaries between the enclosing rocks and the inward-crystallizing front of the magma.

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 TRANSGRESSIVE AGE OF LATE CENOZOIC SILICIC VOLCANIC ROCKS ACROSS SOUTH-EASTERN OREGON; IMPLICATIONS FOR GEOTHERMAL POTENTIAL

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Rhyolite, rhyodacite, and dacite domes and flows are common in and south of the northwest-trending Brothers fault zone that extends from Newberry Volcano near Bend to the eastern margin of Harney Basin and possibly beyond. Regional geologic evaluation by Walker indicated that the silicic rocks are progressively older in a southeastern direction away from Newberry Volcano, where the rhyolitic rocks are Pleistocene and Holocene in age. This is confirmed by K/Ar dates. The distance of major silicic rock masses from Newberry Volcano and their isotopic ages are: China Hat, East Butte, and Quartz Mountain, 15 to 30 km, 1 m.y. and less; Cougar Mountain and Frederick Butte, 40 to 60 km, about 4 m.y.; Glass Buttes, 100 km, about 5 m.y.; Horse Mountain, Owen Butte, Drews Ranch, Cougar Peak, Thomas Creek, McComb Butte, and Tucker Hill northwest of Lakeview, 110 to 160 km, about 7 m.y.; Palomino and Burns Buttes near Burns, 160 and 170 km, 6 and 8 m.y.; Beatty Butte, 210 km, 10 m.y.; and Duck Butte, 260 km, 10 to 11 m.y. The ages increase toward the southeast at an approximate rate of 2 cm per year. This temporal relation and association of the silicic masses with a major fault zone suggests a tectonic control of magma genesis that may be related to plate movement or mantle convection.

Young shallow silicic volcanic bodies serve as heat sources for most, if not all, commercial geothermal fields. The age relations in southeastern Oregon suggest that silicic bodies young enough to be commercially attractive as heat sources may occur near the northwestern end of the Brothers fault zone.

INTEGRATED EXPLORATION IN GEOTHERMAL AREA

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Preliminary testing of an integrated exploration system designed for detection, delineation, and evaluation of potential geothermal resources in the State of Utah has been in progress since June 1973. It is intended to use photo-interpretation, field mapping, structure, petrology, geochemistry, microearthquakes and seismic noise, heat flow, resistivity and induced polarization, gravity, electromagnetics, magnetotellurics and magnetics in a modular exploration program designed for optimum definition of earth models applicable to the area under investigation.

The Fumarole Butte area, near Delta, Utah, was selected as the first field site because of the presence of a thermal spring and

basalt stack isolated from the geophysical earth models. Attempt data simultaneously s earth models which sa  
 The geochemical have been analyzed to on the geophysical mo to solution of one ge Range is illustrated

SHONKINITE-SYENITE PL CALIFORNIA

Watson, K. D., Depa Angeles, California Survey, Menlo Park of Geology, Pomor

Four Precambrian p and three composed ma near the large rare-e two best-exposed shor were mapped at 1:600 are, in intrusive sec enite, syenite, quart minette dikes overlap lte and granite; rare youngest intrusive. aegirine-augite, hor portions. Mean comp

Biotite-shonkinite  
 Biotite-amphibole sy  
 Amphibole syenite  
 Syenite

Quartz syenite-grani  
 Minette

Phlogopite-carbonate

The geological map erentiation in place disrupted tectonical sequence may indicat ting source.

HOLOCENE MOVEMENT ON MATEO COUNTY, CALIFOR

Weber, Gerald E. California, Sa U. S. Geologic

A major fault zone b north of San Francis parallel to the Cali