

AN ABSTRACT OF THE THESIS OF

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Title: GEOLOGY OF THE RATTLESNAKE AND OLDER
IGNIMBRITES IN THE PAULINA BASIN AND ADJACENT
AREA, CENTRAL OREGON

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The area of this investigation lies on the south side of the Ochoco Uplift in central Oregon; it includes the Paulina Basin and the southwestern part of the John Day Uplift.

This study concentrates on four ignimbrites, each less than 100 feet thick. The lower ignimbrite (15.8 m. y.) belongs to the Mascall Formation of Miocene age; the remaining three have been assigned to the Danforth Formation of Pliocene age and are referred to as the crystal-rich (lower unit, 9.2 m. y.), the crystal-poor, and the Rattlesnake ignimbrite (upper unit, 6.1 m. y.) members. The Mio-Pliocene boundary in the Paulina Basin is placed at the base of the crystal-rich ignimbrite, i. e., the base of the Danforth, on the basis of its radiometric age and mammalian fossils found in associated sediments.

The four ignimbrites are vitric tuffs and can be distinguished by

their lithologies or by using petrographic methods. They are rhyolitic in composition, the silica content ranging from 73 to 78 percent. Although composed largely of glass, crystal fragments of alkali feldspar, quartz, magnetite, clinopyroxene, and zircon are common. Phenocrysts commonly form one to five percent of the rock but range from 0 to 18 percent. The Rattlesnake ignimbrite contains a small amount of black latitic pumice that has a mineral assemblage of plagioclase, olivine, and augite.

Pliocene ignimbrites of the Paulina Basin are correlative to three ignimbrite members of the Danforth Formation exposed in Devine Canyon north of Burns, Oregon. The Rattlesnake ignimbrite member is also equivalent to the ignimbrite member of the Rattlesnake Formation in the John Day Valley. This correlation is supported by lithologic and petrographic similarities, mammalian fossils, potassium-argon age dates, geomagnetic polarity, chemical composition, stratigraphic position and alkali feldspar compositions.

The Rattlesnake ignimbrite extends over approximately 6500 square miles in the valleys of the John Day River, North and South Forks of the John Day River, Mountain Creek, Murderers Creek, Paulina area, Bear Valley, and the Harney Basin. It has an average thickness of 45 feet and a volume in excess of 55 cubic miles. The source for the Rattlesnake ignimbrite is thought to be in the Harney Basin. This is indicated by an increase in the thickness, welding,

devitrification, vapor phase mineralization, and potash content of the alkali feldspars toward the basin. Mixing of magmas is indicated by the presence of banded pumice of rhyolitic to latitic composition in the Rattlesnake ignimbrite.