BASALTS OF ALLEN RANCH AREA
UVALDE COUNTY, TEXAS

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ABSTRACT

The alkaline igneous intrusions west of the Nueces River in Uvalde County are part of an igneous province that roughly parallels the Balcones Fault zone in central Texas. On the Allen Ranch olivine basalts nepheline-olivine basalts nephelinite, and melilite nephelinite cut limestone of the Austin and Anacacho units.

Large bodies of nephelinite and melilite nephelinite form the corners of a rectangular area, with olivine basalt occupying the low central area. The olivine basalt mass is an older "sill-like" intrusion that has been cut by the more mafic rocks.

Most of the rocks contain either plagioclase or nepheline as the mineral phase in the spaces between titaniferous augite crystals; but the rocks in the cluster of intrusions at Waymiller Butte exhibit both nepheline and plagioclase surrounding more euhedral augite crystals. Plagioclase and melilite are never found in the same rock.

Measurements of index of refraction and specific gravity of 56 artificial fusions indicate that there is a general relationship between the mineralogy of the rocks and the physical properties of the artificial glasses. Plots of index of refraction vs. specific gravity for fused rocks from the thesis area and some related phonolite samples from the same igneous province show three clusters of points lying along a straight line. Glasses made from a group of basalts from Union County, New Mexico, also plot in an elongate cluster on this line.

The theory of the origin of alkaline igneous rocks by partial melting of eclogitic material below 60 km as proposed by Yoder and Tilley (1962) is accepted as the origin of the rocks in the thesis area. According to this theory the composition of the original eclogite at high pressure determines whether or not the magma produced by partial melting will have tholeitic or alkalic characteristics when it reaches the surface. Alkaline magmas are formed by partial melting wherever the original eclogite is relatively rich in omphacite. Presumably both physical and physicochemical conditions affect the omphacite to garnet ratio in the eclogite.